University of Alberta

Social Mobility and Fertility in Canada:
An Exploratory Study

By

Geoffrey Tobin Rowe ©

A thesis submitted to the Faculty of Graduate Studies and
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degree of Doctor of Philosophy

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ABSTRACT

The hypothesis that social mobility and fertility are associated arose as early as the late 1800's in connection with the eugenics movement. Since then, the hypothesis has been variously interpreted at various times. Sometimes, it has been taken to imply that, all else being equal, the presence of children will tend to inhibit promotion of a labour market career and, at other times, career success has been seen as a precursor to family growth.

This thesis is concerned with an empirical examination of the link between social mobility and fertility. Evidence supporting reciprocal relations between social status attainment and reproductive decisions is examined using Canadian data drawn from a national survey of intergenerational change in education and occupation. As far as is possible, the evidence is evaluated from a dynamic perspective: in terms of a sequence of reproductive decisions and in terms of stages of intergenerational and intragenerational mobility.

The conclusions that this thesis draws focus attention on the complexity of both labour market and family career decision making. Reciprocal relations between

intragenerational social mobility and fertility are supported by data, but the character of the relationship depends on the parity of the birth under consideration. Relations involving intragenerational mobility have markedly greater support than do relations involving intergenerational mobility.

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LIST OF ABBREVIATIONS

SMF - Social Mobility-Fertility (Hypothesis)

CEB - Children Everborn

E(CEB) - Expected Children Everborn

O - Origin (Father's) Status at Respondent's Age
16

E - Status at Labour Force Entry

S - Status at Time of Survey

LFS - Labour Force Survey

CHAPTER 1

INTRODUCTION

1.1 An Overview of Fertility Research

In her 1997 presidential address to the Population Association of America, Mason (1997) argued that "the crisis in our understanding of fertility transitions is more apparent than real". But, she also maintained that "At least with regard to fertility transitions, we have perhaps too many formal theories, none of which seems wholly satisfactory." Mason's comments are echoed in other major reviews of the state of fertility research in recent decades - notably, Van de Kaa (1996) and Robinson (1997). As Van de Kaa put it:

> "the quest for the determinants of fertility behaviour and change during the last half-century can best be interpreted as the development of a series of sub-narratives from different disciplinary perspectives and orientations"

As such demographers and other students of population may well have succeeded in explaining sets of empirical observations in discrete cases, but have failed to integrate their theories.

The development of fertility research, as described by Van de Kaa, initially involved only *Classical Transition* theory (immediately after World War II), but soon led to the more or less simultaneous efflorescence of Technical/Biological, Economic, Social/Psychological and

Cultural orientations. Van de Kaa surveys the timing and type of orientation in 'a broad selection' of 450 publications. The survey seems to indicate that, after being the dominant orientations since the 1960's, interest in Economic and Social/Psychological styles of explanation is now on the wane and Cultural explanation on the rise. In contrast however, Robinson contends that "The 'economic model' has, for the last 15 to 20 years, been the dominant explanatory paradigm in fertility" and focuses his review exclusively on that model. Conflicting views of research trends emerge depending on perspective: that is, if emphasis were given to one or other time scale of fertility change, to one or other sub-discipline, to a specific country or exclusively to analysis of micro-data. Nevertheless, research on the inter-relationship between social mobility and fertility has not recently been an active topic regardless of perspective.

In describing research on Canadian fertility dynamics, Beaujot (1991) adopted a factoral approach. Considerable emphasis is given to proximate factors such as change in fertility exposure arising from changing marriage, cohabitation and divorce (for which a wealth of micro-data exists). There is limited examination of economic factors using individual level data. Kyriazis (1982) and Wright (1988) both explore associations between fertility and current income. Balakrishnan, Lapierre-Adamczyk and Krotki (1993) provide a unique view of Canadian fertility based on the only national fertility survey yet conducted in Canada. They report that "even within the three age cohorts, there were no significant differences in fertility according to perceived social mobility" and that "the overall relationship between income and fertility is weak, if not non-existent". Yet, they also show substantial fertility differences associated with education level (a precursor of social mobility) and an association with wealth (exhibited in the correlation between fertility and value of the home).

The current emphasis given to cultural factors is especially important in Canada. The anglophone/francophone division as well as the relative size of Canada's immigrant population creates cultural diversity. Cultural factors may result in persistent fertility differences (Halli, 1987). Krishnan (1987) finds that the effect of income varies by generation of residence and concludes "fertility decision making has more to do with group norms and values rather than current or prospective economic well-being". Nevertheless, as Beaujot implies, it may be that culture provides the context and economics describes the process.

Cultural factors are equally important in broad and very recent changes taking place in the Canadian family (Ram, 1994; Beaujot, 1994; McVey and Kalbach, 1995), which may be leading to fundamental change in the relationship between nuptuality and fertility (McDaniel, 1994). Similar changes are taking place in the labour force participation of women and in particular married women (McVey and Kalbach, 1995). McDaniel considers that modeling these processes for females involves simultaneously marriage, childbearing, family and career. In her view, the complexity of these processes require that demographers give greater emphasis to micro-models of childbearing decisions and to clarification of the boundaries between choice and non-choice in childbearing.

1.2 Social Mobility and Fertility

This dissertation examines the hypothesis that there is an association between the reproductive performance of Canadians and their success in maintaining or improving their socio-economic standing relative to that of their parents. This hypothesis, the Social Mobility-Fertility Hypothesis (SMF), has been a matter for conjecture by students of population for nearly a century. But, it only began to be subject to rigorous empirical test with the advent of large-scale survey data. The logic of the hypothesis is that the difficulties involved in achieving upward social mobility may be exacerbated by the presence of children (or vice versa). It is often assumed that the processes of social mobility and fertility are mutually inhibiting.

This hypothesis influenced developments in research on the determinants of reproductive behaviour in relation to the application of the micro-economic theory to fertility (Becker, 1960; Willis, 1973). But, SMF implies that observed associations between fertility and economic factors have a dynamic (intergenerational) basis, rather than the static one implied by simple relations between fertility and family budget constraints.

A dynamic alternative to the micro-economic framework provides a link between an individual's cumulative experience and his or her behavioural responses. Static association of family budgets and fertility gives no consideration to learning or adaptation or to the initial conditions of socialization in the family of origin and the potentially diminishing influence of such socialization with time. SMF provides a broader framework for explaining variations in fertility response to economic factors.

Despite its empirical successes, there has been dissatisfaction with the micro-economic model of fertility (e.g. Blake, 1968). This dissatisfaction involved the failure of the economic model to account for differences among groups identified by characteristics that have no direct economic basis (e.g. religious or ethnic groups). But, SMF has had a weaker impact than it might, because it does not readily provide an alternative hypothesis that contradicts micro-economic models. The inclusion of group identification (cultural) terms in empirical models may establish the significance of inter-group differences, but the interpretation of such differences as representing normative differences is merely attribution.

Easterlin's Relative Income Hypothesis (especially, Easterlin, Pollack, and Wachter, 1980) promotes the view that economic factors are important in determining fertility decisions only in relation to tastes or preferences. These tastes are assumed to have been influenced by the standard of living maintained in the family of origin. The relationship between Easterlin's work and SMF is immediately apparent. The main differences being that: (1) the Easterlin model was developed in reaction to a simplistic form of the micro-economic model and (2) that the Easterlin model has been tested primarily by considering implications for aggregate fertility time series (Easterlin, 1968). Reexamination of the Easterlin hypothesis from the standpoint of individual social mobility provides a more natural and stronger test of its empirical standing than is possible with time series data.

An empirical examination of SMF requires special data, because of its intergenerational focus. The data examined in this dissertation were obtained from the CARMAC study of social mobility in Canada (Boyd and McRoberts, 1974; Porter, 1974). This data set provided comprehensive survey data including retrospective data on the occupational history of respondents and occupational characteristics of their fathers. The data were collected as an adjunct to the Labour Force Survey in July 1973. Thus, a very large sample size was provided in a survey with established design and sampling characteristics. Unfortunately, however, the public use form of the survey data did not permit the reconstruction of families from individual responses. As a consequence, although providing the essential fertility and occupational variables, the data were not ideal.

Serious criticisms are leveled against empirical studies of fertility that involve regression of children everborn (CEB) on explanatory characteristics (see Appendix A). These criticisms suggest that such regressions may estimate only a very restricted type of association. The alternative to such regressions, which has been employed in this dissertation, involves a sequence of parity-specific logistic regressions. The use of logistic regressions by parity requires careful justification with retrospective data. The difficulty concerns specification of causal relations between an event that has already occurred and explanatory variables whose reference period is the time of the survey. This is a problem frequently encountered (but infrequently discussed or resolved) in the examination of associations between family income and achieved fertility (e.g. nearly all studies employing census data would involve this problem). Partial resolution of the problem has been to exploit explanatory variables that have a time reference predating fertility (e.g. family background). In the case of mobility within a respondent's career, the average rate of career mobility was treated as a dependent variable determined jointly with fertility.

This approach begs the question of whether fertility-mobility relations represent pre-planned or path-dependent contingent effects. Rigorous study of that problem would require data in the form of detailed life histories. Nevertheless, the CARMAC data are sufficient for present purposes. SMF does not purport to describe the detailed processes of career or of family planning (e.g., in the narrow sense of determining the spacing of career promotions or birth intervals). Rather, it suggests that there may be an association between the two.

The second chapter of the dissertation deals with background literature most directly relevant to the theoretical issues. The most serious of these issues concern the questions: (1) what has been the basis for the confusion over which variable (mobility or fertility) is the dependent variable, and (2) how clearly linked are the theoretical positions espoused and the empirical models examined? This discussion is necessarily disjointed, since there is no single coherent theory or approach. Furthermore, there are unresolved issues concerning whether the characteristics of an individual's family of origin represent proxies for unobserved individual characteristics or whether those characteristics represent independent explanatory constructs (e.g., representing socialization).

Details concerning the data source, the characteristics of the sample and some potential sources of bias are considered in the third chapter. The fourth chapter comprises detailed empirical results. The latter are considered from several points of view: (1) aggregate fertility-mobility associations are derived from parity-specific estimates, and the implications of several alternative specifications are discussed, (2) parity-specific results are presented and discussed in contrast to the aggregate relations and (3) the estimated effects of alternate sets of control variables are considered at both aggregate and parity-specific levels. The final chapter provides an overview of the implications for further research. Two appendices are attached: Appendix A provides criticisms of aggregate regression on CEB as an analytical approach in fertility research. Appendix B gives details of technical points considered at various stages in the body of the dissertation.

CHAPTER 2

LITERATURE AND THEORY

2.1 Introduction

The idea that social mobility and fertility may be related is an old one, among the oldest in socio-demographic research. Yet, while the issue has been examined repeatedly, the refinement of analytical and theoretical tools for its study has not kept pace with the increasing sophistication of data. As a consequence, the prevailing opinion of researchers is that the study of relations between social mobility and fertility ought either to be abandoned (Blau and Duncan, 1967; Boyd, 1973), or the nature of the hypothesized relationship be revised (Tien, 1961; Perucci, 1967; Hope, 1971; Bean and Swicegood, 1979; Stevens, 1981). Yet, there has been a failure to explicitly identify the relationship as being between two dynamic processes. Instead, data analysis has been carried out in a fashion more appropriate to the study of static differences. This chapter will be concerned with a review of previous findings, and a discussion of sources of bias. An alternative model will be proposed, which satisfies some objections to previous work. Finally, directions for further research will be considered.

2.2 Literature on the Social Mobility-Fertility Hypothesis

The earliest explicit statement of SMF is usually attributed to Dumont (1890). Dumont's *Social Capillary* thesis identified small family size as a necessary pre-condition to the social advancement of family members. Early empirical work (Bertillon, 1899; Heron, 1906) supported the conjecture to the point that "the existence of a negative association-between family size and social class has acquired the status of a 'law'" (Berent, 1952, p. 244). The relationship with which these early researchers were concerned involved contemporaneous fertility differences among individuals occupying different social statuses. Dumont feared that:

> "the universal desire for social advancement coupled with social conditions which permitted advancement would inevitably lead to low fertility (the break-up of the French family" (Thomlinson, 1965, p. 63)).

A more modern expression of these same issues (Becker and Lewis, 1973; Willis, 1974; Becker and Tomes, 1976) might focus on relationships among per capita income of families, fertility decisions, time constraints on the production of income, average expenditures per child and anticipation of each child's future welfare.

Fisher (1929) provided an early elaboration of SMF. Fisher took exception to early interpretations of SMF that associated biologic infertility and status. Rather he identified fertility in both the current family and the family of origin as being implicated in the relation. Two mechanisms were involved: (1) fragmentation in the inheritance of property (as associated with the size of the family of origin); and (2) constraints on individual endeavour (associated with current family size). From this perspective, Fisher was able to argue that infertility could be implicated, but only insofar as it might provide a selective advantage to individuals with high aspirations. In this regard, there would be no meaningful distinction between mechanisms involving biologic infertility and those involving deliberate fertility control. This emphasis on selectivity directly reflected Fisher's connection with the eugenics movement. The association of low fertility and high status implied that "the process of vertical mobility was believed to lead to a waste of societies 'best' biological stock" (Westoff, 1953; p. 25) (i.e. by curtailing reproduction of the *best stock*).

Berent (1952) was critical of the early perspectives for adopting an inherently static approach. The static element could be identified both in the data employed and in the character of explanation. The data on which most early studies were based comprised marginal distributions of family size by social class. Typically, no information was available on the social origin of those occupying a current social class, on the fertility background of those who had changed class or on the current fertility of movers. The static element in the theory directly emphasized fertility as a determinant of mobility chances. Yet, a perspective that focuses on mobility as the dependent variable implies that high fertility places individuals at a permanent and virtually irreversible disadvantage. This approach ignores the potential for compensating efforts and takes no account of the possibility that one of the rewards of successful upward mobility might be the freedom to relax fertility control without suffering financial constraints as a consequence. Berent argued, from a dynamic perspective, that it becomes impossible to identify causal directions a priori (i.e. whether fertility will always be a determinant of mobility, or vice versa).

Berent's work not only filled a gap in previous research, but was also important for having been among the earliest examples of the use of data derived from a national sample survey and was likely the first to apply statistical test procedures in the analysis of SMF. His data were derived from a survey of the adult population of England and Wales, conducted in 1949. Information was gathered on the social position of family members together with comparable information on members of their family of origin. This provided a basis for more careful examination of processes of change than had been possible previously. Berent's concern was with the question of whether the direction of movement between social classes could be associated "with the number of children born to the families concerned" (Berent, 1952, p.244).

Berent interpreted his findings as suggesting that: (1) the family building habits of sons will resemble both the social class of origin and that of destination; and (2) that personal mobility (occurring between marriage and the survey period) was inversely related to fertility (i.e. upward mobility was associated with relatively low fertility, and vice versa). In reference to previous concerns with the social promotion of the infertile, Berent notes that family building habits were simultaneously acquired and maintained. Thus, persons moving from a low to a higher status will have lower fertility than would be expected had they been non-movers, but may have higher fertility than non-movers in the class into which they move. By referring to family building habits (perhaps equivalent to social norms), Berent introduced a form of explanation that involved subjective factors and implied their modification in a changing environment.

Westoff (1953) summarizes prevailing attitudes influencing subsequent research in America. These include: (1) accumulating evidence of change in fertility patterns (which ultimately led to the Baby Boom); (2) the importance of the eugenics movement in the United States (see also Petersen, 1964); (3) the success of large-scale sample surveys in regard to SMF (in England and France (Bresard, 1950; Girard, 1951)); and (4) evidence from the Indianapolis study (Kiser and Whelpton, 1958) that similar, possibly stronger, relations might be found in the United States. The Indianapolis study (published in five volumes, titled "Social and Psychological Factors Affecting Fertility") was initially oriented toward an examination of psychological effects (e.g. effects of "feelings of economic insecurity", of "feelings of personal inadequacy", or of "religious interest"). But the study provided evidence that economic factors (specifically social status and mobility) were of more importance. A reaction to the excesses of the eugenics movement may have contributed to the initial psychological orientation of explanation.

In that context, it might have seemed natural to try to extend Berent's work on the impact of mobility on fertility. Moreover, the subjective character of family building habits merges easily with an emphasis on the psychological orientation of individuals who are motivated towards upward mobility. Thus, the results of the Indianapolis study formed the basis for a more long-term project, having the effects of mobility aspirations as its focus:

> "... the ideal type of the couple either in the actual process of vertical mobility or effectively geared toward its anticipation probably has the following characteristics: a maintained rationality of behaviour; intensive competitive effort; careerism with its accompanying manipulation of personalities; psychological insecurity of status with attendant anxieties; and an increasing exhaustion of nervous and physical energies; in short a pervasive success-orientation and all that is implied with it .. having children is considered inimical to social and economic ambitions" (Westoff, 1953, p. 404).

This position is notable in three main respects: (1) the SMF association arises from fertility control motivated by concerns which do not involve children as such; (2) the principles of explanation are primarily social-psychological; and (3) the characterization represents a program to be followed to achieve upward mobility (what of downward mobility?).

The outcome of this re-orientation of fertility research was the Princeton Study (Westoff, et. al., 1961, 1963), a long term panel study which examined the behaviour of a sample of American couples over a ten year period following the birth of their second child. The results, relating to SMF, were summarized by the statement that no correlations with fertility of any significance emerged when, by use of a prestige scale, the measure of occupational mobility was more finely resolved than with a crude white-collar/blue-collar classification. This conclusion applied not only to intergenerational mobility but also to changes of occupational status within the husband's own career (Westoff, et. al., 1961). This conclusion has been challenged on methodological grounds (Zimmer, 1981); however, accommodation of the criticisms appears to lead to no change in the conclusion (Westoff, 1981).

Westoff (1963, p. 240-1) noted that the Princeton results could have involved insensitive or unreliable measures, but his own feelings were (following Freedman (1962)) that: "the original hypothesis of a negative correlation is linked to an outdated view of urban society". Freedman's position was that social mobility - currently -- has been routinized or institutionalized and that individuals follow stable *bureaucratic career lines*. Thus, rather than engendering anxieties or demanding personal sacrifice, social mobility is taken for granted in the normal course of events.

In reaction to this perspective, Namboodiri (1974) notes that the emphasis on psychological factors has resulted in a neglect of the potential feedback effects that fertility might have on mobility. This neglect is no doubt linked to the difficulty of providing a psychological argument relating high fertility achievement or aspirations to an indifference towards upward mobility (or, perhaps, a desire for downward mobility?). An analysis of the Princeton data was attempted (Featherman, 1970), involving regression of mobility on fertility, but the specification of the equations was so bad that no conclusions can be drawn from the published results.

Namboodiri's work (1974a & b) focuses on Berent's claim that the causal direction of influence in SMF cannot be determined *a priori* and carries this point further by suggesting that the hypothesis identify both current family fertility and destination status as jointly dependent variables. Furthermore, Namboodiri notes the close relation that would be anticipated from known associations between economic factors and fertility (e.g., in the Becker-Willis-Tomes models). Thus, neither a psychological nor an economic explanation seems to be sufficient, in itself; and, in combination, the two types of explanation require a model of joint fertility-mobility dependence.

The single study which most accounts for the low repute of SMF, currently (Stevens, 1981), was a component of Blau and Duncan's (1967) study "Occupational Changes in a Generation". Their data represented the base for a thorough investigation of the occupational structure of the United States, but attention was also given to mobility as a determinant of fertility. Both in their analytical approach and theoretical interpretation, Blau and Duncan drew heavily on Berent. The analytical model employed was a two-factor ANOVA, with fertility dependent and with current and previous generations' occupational statuses providing the independent variables. An extension of Berent's approach was provided by the inclusion of an interaction term to capture non-additive effects of mobility on fertility. Interpretation focused on Berent's idea of partial adaptation from the family building habits of the origin status to the habits of the destination status. Having identified these habits as norms, Blau and Duncan argued that the additive marginal effects of origin and destination status would reflect a mixing of norms and that a uniquely mobility induced effect would therefore need to be represented by a non-additive term. Their results indicated that a strictly additive model was sufficient to characterize all of the non-trivial variation in numbers of children everborn (CEB). This permitted them to conclude that mobility, per se, had no influence on fertility. Their results were of the same character as Berent's, but differed in interpretation and have been replicated since (with further generalizations) (Bean and Swicegood, 1979; Stevens, 1981).

Blau and Duncan's approach was deficient methodologically. Namboodiri's identification of destination status and fertility as jointly dependent variables points directly to a source of bias in the analysis. In addition, Hope (1972) described the inconsistency involved in the unrestricted estimation of marginal origin and marginal destination (normative) effects. Without further justification, it can not be presumed that the normative effect of a status as an origin status differs from its effect as a destination status and so, Blau and Duncan's statistical model was over-parametrized. Finally, there is inconsistency in the identification of the mobility (interaction) effect. This inconsistency arises from Blau and Duncan's interpretation of the determinants of destination status. In schematic form, the Blau-Duncan fertility equation is:

$$CEB = a + b_1O + b_2S + b_3OS + e, \qquad (2.1)$$

where O is origin status, S is destination status, and e is a random error). The simplest form of the Blau-Duncan *Status Achievement* models:

$$S = c + dO + u, \qquad (2.2)$$

which when substituted in the fertility equation gives:

$$CEB = (a+b_2c) + (b_1+b_2d+b_3c)O + b_3dO^2 + (b_2+b_3O)u + e. \qquad (2.3)$$

The term representing interaction between origin and destination statuses may merely describe an interaction between origin status and chance effects in mobility (i.e. that involving the random term u). Other extensions of the Blau-Duncan analysis have focused on further partitioning of the variance in relation to: (1) planned in contrast to unplanned fertility (Bean and Swicegood, 1979); and (2) origin, mean destination, and actual destination status (Stevens, 1981). In no case, has the complexity of the non-additive mobility effect been explicitly considered.

2.3 The Status of the Social Mobility-Fertility Hypothesis

The development of SMF may provide an interesting case study of the role that both research techniques and political concerns play in influencing research directions. It seems very likely that the emergence of the large-scale sample survey, as a research tool, played a part in determining the focus of SMF research. Reactions to the eugenics movement and the adoption of a psychological frame of reference have been equally influential (Kevles, 1985).

Historically, SMF research might be characterized by a sequence of shifts in focus. Initially, the concern was with the impact that children might have on mobility chances ("For one who starts at the bottom to arrive at the top, it is necessary to run fast and not to be encumbered with baggage" (Dumont, 1890); quoted from Petersen (1969, p. 501))). In these terms, it was regarded as likely that excessive fertility might result in a family being dragged down. With the subsequent availability of survey data, it became possible to examine these processes more directly. In addition, attitudinal data became as accessible as data on family size, occupation, income, etc. The shift in emphasis, from static marginal associations to dynamic relations (with behaviour influenced by social-psychological factors), altered the focus to the effects of mobility on fertility. The implicit assumption of a universal desire for upward mobility resulted in an emphasis on explanatory terms that would be most consistent with movement in that direction.

The current opinion in much recent literature, that the association between fertility and mobility has little or no empirical support, represents the outcome of increasingly sophisticated analysis of data. But the models that have been applied to SMF data are most appropriate for the study of static differences. Since the hypothesis requires dynamic relations, SMF has not yet been tested in a statistically rigourous manner.

2.4 Theoretical Perspectives

It is necessary to consider the theoretical frameworks employed to explain SMF more or less independently of their historical development. The historical shifts in focus, the introduction of new analytical tools or data collection techniques and politics have all contributed to a lack of continuity in the treatment of SMF. Thus, the theoretical development of SMF is characterized by divergent paths, rather than by a progressive sharpening of concepts.

An enumeration of the theoretical perspectives employed in recent research (Bean and Swicegood, 1979; Stevens, 1981) reveals a continuing emphasis of fertility as the dependent variable. Four major perspectives are generally identified, of which three might be regarded as having a primarily social-psychological basis. The fourth involves family budget constraints (i.e. concrete constraints related to relatively fixed effort, money or time resources).

2.4.1 Social-Psychological Perspectives

The social-psychological approaches may be distinguished by their concern with the aspirations of a couple (jointly, or as individuals) or with the consequences of mobility for the couple's social integration, as these relate to their reproductive behaviour.

The theoretical perspective that focuses on aspirations is termed the *Status Enhancement* model, and is primarily linked with Westoff and his co-workers. The major elements of this approach are evident in the discussion in Section 2.2. The existence of a pervasive success-orientation is regarded as precluding a desire for children (or for relatively large numbers of them). This relation characterizes success-oriented and family-oriented couples as mutually exclusive categories.

Blau and Duncan focused most of their attention on the normative determination of fertility levels, as these relate to the standards prevailing at both status of origin and of destination. However, they also proposed an explanation for minor deviations from marginal additivity. The basic process, as they regarded it, was one of socialization in the origin status and adaptation to the norms of the destination status. This process involved the disruption of established social ties followed by attempts to form new ones. It was hypothesized that the disintegrative effects of mobility could operate on fertility in two distinct ways. Firstly, the disruption of social ties may induce stress or disorientation to such a degree that family building (with its accompanying emotional demands) is regarded as an added burden. Thus, fertility would tend to be reduced among the mobile regardless of the direction of mobility. Secondly, the social isolation resulting from the disruption of ties might induce an interest in fertility as a means of emotional compensation. Thus, regardless of the direction of mobility, fertility might be expected to increase among mobile couples. Together, these frameworks represent the *Social Integration* perspective.

It is clear that the *Status Enhancement* and *Social Integration* perspectives are not competing hypotheses. The former deals with factors that begin to be operative prior to mobility, while the latter requires that some mobility has taken place before becoming operative. Similarly, the *Stress* and *Social Isolation* alternatives seem to relate to the consequences of the breaking of ties and of success in forming new ones, respectively. It is tempting to argue that these perspectives characterize stages in the mobility process and that each could be operative at different points in a couple's mobility career. In any event, the implicit time reference in each implies that the relation to fertility must be quite complex. Without controlling for, at least mobility timing and age at first birth, no clear prediction can be put forward regarding the differences in completed family size by mobility status. The existence of feedback (fertility effects on mobility) could further accentuate the importance of mobility timing as a factor determining when or if fertility is to be either accelerated or prematurely terminated.

Namboodiri (1974a) has expressed a concern with psychological explanations of fertility. It is undoubtedly true that the psychological characteristics of a couple who have decided about an additional child are important. However, as Namboodiri notes:

> "... psychological factors purporting to explain fertility differences may be classified into two mutually exclusive and exhaustive categories:
>
> (a) those with recognizable antecedents located 'outside the individual', and
>
> (b) those with no such recognizable antecedents.
>
> As far as psychological variables of category (a) mentioned above are concerned, a relatively complete specification of how they affect fertility would involve (1) identifying their antecedents among social situational factors, (2) specifying the causal connections between social situational factors and psychological factors, and (3) specifying the causal connections between psychological factors and fertility." (Namboodiri, 1974a, p. 466)

In these terms, the *Status Enhancement* and *Social Integration* perspectives clearly belong to category (a). Just as clearly, the inadequacies of the perspectives involve the failure to identify their antecedents (e.g. the prevalence of success-orientation in a population). Furthermore, their failure to provide unambiguous and testable predictions is a consequence of these inadequacies. More generally as regards psychological explanations of fertility (e.g. the normative explanations of status fertility differences), Namboodiri recommends greater rigour. The analytical difficulties and responsibilities facing those proposing normative explanations are considerable (Hawthorn, 1970). This is primarily because the character of explanation involves little more than the stipulation that behaviour among individuals is correlated. The question of with whom, how much or why is largely left open.

2.4.2 Economic Factors - The Easterlin Model

Easterlin (1969, 1975) provides the basis for another perspective. Easterlin's *Relative Economic Status* model represents an essentially economic model of fertility decision-making, which contains endogenous preferences. Thus, the essential features of the model are: (1) that decisions are made (as, in theory, are all consumer decisions) by finding a preferred balance among desires for a range of costly goods and the means of paying for them; and (2) that the level of material consumption with which a individual will be satisfied may have largely been determined in the home environment in which he or she grew up. Any disparity between the preferred material standard of living and the means to maintain those standards is an outcome of social mobility. In conventional consumer theory, increases in income (perhaps associated with upward mobility) ought to coincide with increased expenditures on material goods. However, if the level of satisfaction with such goods (as measured against the standards in the family of origin) has already been reached, then discretionary income is available to finance additional children. In the case of downward mobility, the desired level of material satisfaction may become impossible to achieve, in which case fertility might be curtailed.

The Easterlin hypothesis explicitly relates fertility with labour market opportunity and performance.

> "The basic idea is that if young men - the potential breadwinners of households - find it easy to make enough money to establish homes in the style desired by them and their actual or prospective brides, then marriage and childbearing will be encouraged. On the other hand, if it is hard to earn enough to support the desired style of life, then the resulting economic stress will lead to deferment of marriage and, for those already married, to the use of contraceptive techniques to avoid childbearing, and perhaps also to the entry of wives into the labour market." (Easterlin, 1973, p. 81)

In these terms, the Easterlin hypothesis is

> "... the conjunction of two more basic hypotheses: that aspirations are primarily determined by adolescent experience and that fertility is a function of a young man's earnings relative to his aspirations." (Ermisch, 1979, p. 40).

The empirical evaluation of these hypotheses has generally involved the use of time series data, for which the construction of a valid *Relative Economic Status* measure was a critical step (Freedman, 1963; Easterlin, 1973; Easterlin and Condran, 1976; Lee, 1976; Wachter, 1975; Ermisch, 1979).

Many of the measurement problems associated with Easterlin's hypothesis disappear in the context of individual level data. The basic issues are addressed in Ben Porath (1975) who concerns himself with the meaning of short (one-generation) and long run (intergenerational) effects and in Leibenstein (1976) who gives consideration to the distinction between *free* and *committed income* in the current generation. Both Ben Porath and Leibenstein identify

Easterlin's hypothesis as a variant of the *permanent income* hypothesis of consumer demand (Friedman, 1957).

Ben Porath distinguishes between Net and Gross effects of the characteristics of the previous generation. The importance of the distinction may be illustrated in terms of a simplified SMF model:

$$CEB = a + b_1S + b_2O + b_3X, \tag{2.4}$$

$$S = c + dO, \tag{2.5}$$

where the variables CEB, O, and S are fertility and status variables (as in Section 2.2) and X represents other relevant variables. The Net effect of O (b_2) may be contrasted with the Gross effect ($b_2 + b_1d$) -- it is assumed that $b_1>0$, $b_2<0$ and $d>0$.

The significance of the variable O can be assessed in two ways: (1) the Net effect of origin status may be zero; and (2) even in the event of a non-zero Net effect, the Gross effect may still be zero. The latter can not be evaluated without reference to the mobility equation. In order to reject the hypothesis that O has a bearing on current generation fertility, it is necessary that $b_2=0$ and $d=0$. The latter result is virtually inconceivable in light of empirical studies of intergenerational status associations. In that regard, Ben Porath notes that the direct effects of the previous generation (b_2) may be significant as a result of the use of imperfect proxies for the current generation's characteristics (e.g. because fecundity is unmeasured and is correlated within families, or as a result of correlation in tastes across generations). That is:

> "If we had direct and correct measurement of all relevant variables describing the second generation, the 'prices', the 'income', and the 'tastes', there would be no room for direct first-generation effects and for variables describing the first generation in equations describing second-generation fertility." (Ben Porath, 1975, p. 397).

Estimates of direct effects of O on fertility may be a measure of the inadequacy of the current generation fertility equation. In Namboodiri's terms, O is the antecedent of the current generation's psychological makeup.

It may not be possible to reject the hypothesis of a first generation status effect on second-generation fertility. Indeed, Ben Porath's empirical results tend to support this conclusion:

> "A specific hypothesis offered by Easterlin suggests that the route of long-term effects goes through tastes for consumption, i.e., the children of the rich develop consumption aspirations which tend to depress fertility. As an extension of this hypothesis or independently, there is indeed reason to believe that the number of siblings also affects subsequent fertility. As I have indicated, there is no reason to think that effects of experience in parental home are restricted to consumption; they may equally involve notions and aspirations concerning family size. Given also the possibility of intergenerational correlation in fecundability, there is no obvious way of identifying the specific route of intergenerational effects." (Ben Porath, 1975, p. 405)

Leibenstein (1976) addresses related concerns in his discussion of current generation consumption and fertility decisions:

> "Thus, the consumption choices involved are not similar to choosing between hamburgers and cheese sandwiches for lunch but involve commitments associated with neighborhood, housing, schools, churches, relatives, friends, and a host of established connections and routines of life. One of the questions that must be considered is what happens to 'free income' or uncommitted, immediately expendable income, versus 'committed income', which involves longer-term contractual obligations that are difficult to change. Reformulating this question in terms of intergenerational influences, we must consider the extent to which tastes formed through contact with the older generation influence the subsequent generation to adopt a life-style that involves, at various points in the career cycle, a significantly higher ratio of committed income than that of the previous generation. ... The implication of this is that how one feels about taking on additional obligations that are associated with additional children depends not only on one's consumption-aspiration level but also on the ease of meeting the commitments that are associated with such aspirations. ... This represents a hump in a technical economic sense in that increasing marginal importance is attached to dollars earned to pay to meet the commitment goal or target; and once the goal has been met, the marginal importance of additional dollars earned declines. ... Thus, the 'commitment humps' associated with different family sizes and with different socio-economic groups are likely to be important considerations in decisions about the numbers of children individuals want."(Leibenstein, 1976, pp.429-30)

In some respects Leibenstein's discussion reiterates familiar arguments which emphasize that fertility decisions are major budgetary decisions (analogous to consumer durables Becker (1960)) and that there are norms which limit the idiosyncrasy with which children may be treated subsequent to birth (i.e. welfare norms - Blake (1968), Willis (1972)). However, the discussion serves to emphasize: (1) that it is permanent rather than transitory components of income which form the basis against which decisions are likely to be made, (2) that the permanent component represents, essentially, an income expectation and consequently, (3) that the income component is not directly observable. So, there need be no unique specific order of (say) income achievement prior to fertility decisions. It is inherent in the process that fertility decisions represent the commitment of income that has yet to be earned.

In Leibenstein's terms, it is important to examine the type of consumption that is traded-off against fertility. Children might be foregone in return for longer, more expensive vacations, two cars rather than one or central-city rental accommodation (on short-term lease) rather than suburban home-ownership (with a long-term mortgage). To that extent, it is appropriate to distinguish between willingness to make long-term versus short-term financial commitments. An increased level of fertility in one generation at a given career stage would imply a higher commitment ratio for the following generation at the same career stage. An essential difference between generations with differing fertility might be expressed in terms of time preference for returns on efforts invested.

Increased fertility implies an increasing importance of committed income. That, in turn, suggests (assuming consumption standards established in adolescence) that the mobility conditions necessary to support higher fertility levels may require progressively increasing status gains. Adolescent experience will tend to correspond to levels of living in families that have passed through the economic stress of early years of family formation. Thus, we might expect that tastes would be gradually inflated across generations.

2.4.2.1 Criticism of the Easterlin Model - The Role of Tastes

The critics of Easterlin's approach can be divided into three camps. First, there are those who focus on utility maximization and the trade-off between expenditures on children and consumption of goods (explicit in Easterlin (1978), and Easterlin, Pollak, and Wachter (1980)). These critics include Leibenstein (1974, 1976) and Sanderson (1974, 1980a, 1980b). Second, there are those argue against employing tastes as an explanatory factor. This group comprises the entire Chicago-Columbia school (especially, Schultz (1976), and Stigler and Becker (1977)). Third, there are those who regard the consideration of taste formation variables (e.g., family background variables) as proxies for unmeasured factors of the current generation decision-making (i.e., because tastes are internalized). These critics include both Ben Porath (1976) and Sanderson (1976, 1980a).

Objections to the inclusion of taste factors have generally been raised in the context of utility maximization. Sanderson (1974, 1980b) has shown that utility maximization is an unnecessary feature of the Becker-Willis models. Furthermore, citing research in psychology relating to revealed preferences elicited as responses to experimentally structured rewards, Sanderson (1980b) notes that "The experimental evidence, to date, suggests that neoclassical assumptions concerning utilitarian behaviour may be demonstrably false" (p. 1047).

However, an alternative non-utilitarian model incorporating features of the Becker-Willis model makes predictions that are largely the same as the Becker-Willis model. Thus, Sanderson concludes that (1) utility maximization represents an element of economic models of fertility that serves only to make them less acceptable to non-economists and (2) Easterlin's approach and the Becker-Willis models are not in conflict, but rather complement each other (the latter point is amplified in Sanderson (1976) and (1980)). Sanderson suggests that an essential difference between the models is time-orientation. Easterlin examines conditions existing in the family of origin as they relate to future fertility. Others (Becker (1974), Becker and Lewis (1973), Becker and Tomes (1976), and Tomes (1981)), insofar as they consider social mobility and tastes at all, examine current conditions and fertility decisions as they might relate to the mobility chances (child quality) of children being born. In the first case, relations between the first and the second generations are emphasized, while in the latter case the second and the third generations are of primary concern.

In a non-utilitarian setting, tastes are to some degree necessary; they substitute for the role otherwise played by utility functions. Thus, it is important to be explicit about the types of factors or behavioural influences that tastes are supposed to represent. The view of tastes that Stigler and Becker (1977) prefer (conveniently, for their purpose) is an essentially trivial one, corresponding to the notion of "temporary feelings towards the child" (a notion that Leibenstein (1975) regards as unimportant). More essential aspects include taste factors interpreted in relation to "repetitive behaviour and inertia" and of "selective rationality" (Leibenstein (1980)).

Easterlin's concern with tastes focuses on preferred life style and consequently on demand for consumption goods. It is precisely this highly concrete interpretation of the role of tastes that provides the basis for the link between Easterlin's hypothesis and social mobility. Furthermore, the endogenous character of tastes in the fully developed Easterlin model (Easterlin, Pollak, and Wachter (1980)) represents the primary distinction between it and the competing models. However, as Sanderson (1980a) notes, the endogenous character disappears entirely when attention is focused on a single generation. That is, when time reference is fixed, the past is given and therefore exogenous.

Ultimately, criticisms of Easterlin's hypothesis become philosophical. Ben Porath (1975), for one, can not accept family background variables as representing factors distinct from the internal state of the individual to whom they relate. A contrasting sociological viewpoint would interpret group influences (including those of the family of origin) as having causative status. An individual's socialization need not be deterministic to be causative. It need only contain elements of behavioural constraint that an individual may not freely, or selectively interpret.

Granting family background variables a causative status, the essentials of the Easterlin hypothesis and of the criticisms of it, appear to involve the following questions:

(a) to what extent are tastes for consumer goods the essential feature of socialization as it influences subsequent fertility;

(b) to what extent do tastes appear to be subject to inertia;

(c) how does the fact of social mobility influence (in Leibenstein's terms) the willingness of a couple to adopt a heavier (or less heavy) *commitment ratio* than the previous generation?

These represent questions to be considered at the theoretical level. It would be difficult to answer them directly from empirical study.

2.4.2.2 Predictions of the Easterlin Model and Alternatives

An empirical examination of Easterlin's hypothesis requires a fairly clear specification of alternatives in order to identify conditions under which it would be false. If we accept causative socialization factors (as is done here), then they must precede individual factors. We assume that rejection of the hypothesis that origin status influences fertility requires that origin status have no measurable partial effect on fertility and that destination status is independent of origin status. The importance of this point becomes clear in relation to socialization effects. If both tastes and status were to a large degree inherited, then origin status must be a primary determinant of fertility. Consequently, every study that has documented a negative relationship between fertility and status related variables (e.g. income, education, etc.) and every study that has documented a positive relationship between generational statuses lends support to Easterlin's hypothesis.

Because of differences in time orientation, there is no unambiguous area of disagreement between Easterlin's model and Becker's model. Acceptance of aspects of Becker's model need not imply rejection of the novel aspects of Easterlin's. However, the same can not be said in comparing Easterlin's approach to Leibenstein's. Here important points of disagreement focus on:

(1) whether fertility decisions relate to determining an optimal ultimate family size rather than the marginal value of an additional child;

(2) whether, as the degree of family responsibility for its own welfare increases, its inertia decreases; and,

(3) whether there is a regular change in response to mobility (changing status) as the level of existing commitment (parity) increases?

In Leibenstein's terms, the degree to which a family is immediately responsible for its own material welfare determines the degree to which they must act rationally. It, therefore, limits the degree to which they can allow themselves to respond by habit to their initial tastes. It might be expected that personal responsibility would increase with age and with social mobility (i.e., as the distance from family of origin increases). Rationality ought to increase with parity as well (because of the marginal importance of committed dollars (Leibenstein, 1976)), and parity could play a motivating role in further efforts toward social mobility.

The average rate of career mobility would be at least as important in Leibenstein's view as in Easterlin's model. However, the impact on fertility choices is expected to be increasingly negative as status increases and as parity increases. The feature distinguishing Leibenstein's model from Easterlin's is that it emphasizes a negative association between change in status and change in family size. That is in contrast to Easterlin's positive relation between intergenerational status differences and ultimate family size. In Leibenstein's terms, the negative association comes about because of contemporaneous pressures to maintain a level of commitment appropriate to the status achieved. For Easterlin, the positive association comes about because every dollar in excess of that necessary for a standard of living comparable to the family of origin is regarded as a (potentially) uncommitted dollar.

2.5 Testing the Social Mobility - Fertility Hypothesis

A major difficulty in studying associations between social mobility and fertility is the specification of alternative hypotheses. The problem will be examined in this section with emphasis on the two ways of specifying the dependent variable.

2.5.1 The Dependent Variable in Fertility Equations

The determinants of fertility are commonly assessed by linear regression of children everborn (CEB) on individual or family characteristics. Appendix A shows that this approach may be highly misleading from both statistical and substantive points of view. A better statistical model is one that represents fertility as a sequence of discrete events. Among the simplest ways of achieving this is by linear regressions on the log odds of parity progression.

Logistic regressions take the form:

$$P(C_i) = \exp(Xb)/(1 + \exp(Xb)) \qquad (2.6)$$

where $P(C_i)$ denotes the probability of occurrence of an i'th parity birth, X corresponds to a vector of independent variables and b to a vector of regression coefficients. The regression can be estimated by non-linear optimization; however, it is useful to consider the *empirical logit transformation* for exploratory purposes (Cox, 1972):

$$\mathrm{logit}(n_{ij}) = \log(\, (n_{ij} + 0.5) \,/\, (n_{i+} - n_{ij} + 1)) \qquad (2.7)$$

where n_{ij} denotes the observed number who have made the transition from the i'th to the j'th parity ($j = i + 1$), and n_{i+} denotes the number at risk. Underlying this specification is the assumption of a monotone relation between the measured levels of the characteristics and the odds of an i'th parity birth.

There are difficulties in relating this specification to the literature. Easterlin's model concerns itself with determination of expected total births (E(CEB)). If analysis focuses on parity transitions, then an evaluation of the Easterlin model has to be indirect.

The evaluation of relations between E(CEB) and its determinants proceeds in four steps:

(1) partial derivatives of the log odds with respect to the characteristics (i.e. b) are evaluated by non-linear regression.

(2) derivatives with respect to transition probabilities may be obtained by multiplying the derivatives of $P(C_i)$ with respect to the logit.

(3) partial derivatives with respect to the unconditional probability of being at parity i may be obtained by applying the product rule for derivatives (since unconditional probabilities may be estimated by products of transition probabilities).
(4) finally, the mean (E(CEB)) is a weighted combination of unconditional probabilities, the derivatives of the mean with respect to the characteristics is simply the weighted combination of the unconditional derivatives (weights being provided by values corresponding to CEB=(0, 1, 2, 3, ...)).

Thus, implicit aggregate results with E(CEB) dependent may be examined. Rather than being over-complicated, the approach described above over-simplifies, since no allowance is made for the birth of twins, triplets, etc.

Results might be examined at either the parity or the E(CEB)) levels and it is also possible to apply significance tests at the two levels. Significance tests applied to E(CEB) coefficients represent inferences about the location of the distribution. Significance tests applied at the parity level are more general. They provide information concerning the shape of the CEB distribution.

2.5.2 Mobility Effects on Fertility

The simplest conditions under which a mobility hypothesis could be falsified are those in which status variables (e.g. income, occupation, etc.) are uncorrelated with fertility. However, suppose it were established that fertility differences among status groups exist and those differences were then summarized in a regression equation. The existence of these differences does not imply that status change ought to result in fertility, despite what a little naive algebra might imply. The characterization and the data fail to represent a dynamic relation between two processes.

A more appropriate model includes individual level status measures taken at two points in time. This is essentially the *additivity model* studied by Blau and Duncan (1967):

$$Y = a + b_1 X_t + b_2 X_{t-n} \tag{2.8}$$

Regardless of whether the time points correspond to observations across generations or over a career, the significance of both coefficients demonstrates an association with status change:

$$Y = a + b_1 (X_t - X_{t-n}) + (b_1+b_2) X_{t-n} \tag{2.9}$$

Assuming that the fertility events occurred within the time interval [t-n, t).

An alternative way of representing the relation is:

$$Y = a + (b_1+b_2)(cX_t + (1-c)X_{t-n}) = a + (b_1+b_2)X_{t-m} \tag{2.10}$$

where $0<m<n$, and $c = b_1/(b_1+b_2)$. This form decomposes the relation between status and fertility into two parts: the first term (b_1+b_2) representing a *marginal status effect* which is not specific to either current or past status, and

a second term c that is the basis for a weighted average or interpolation of status observations. A *mobility effect* would involve c for which no direct significance test is available.

The mobility effect in the interpolation equation portrays fertility responses as if to a reference status intermediate between current and origin statuses (X_{t-m}). The linearity of the equation implies that mobility increments ($X_t - X_{t-n}$) are comparable regardless of origin status. The use of a more general average could correct this limitation.

Part of the difficulty in specifying a test of a mobility effect arises from the fact that temporal order and causal hierarchies do not necessarily correspond. Ben Porath has argued that parental background factors can not be regarded as causal. Since decision-making takes place in the present, it depends on the contemporaneous inter-play of factors influencing the decision-maker's internal states. This point of view, representing an element of the philosophy underlying economic approaches, requires that contemporaneous observations be given logical precedence in the model. Thus, a *mobility effect* reduces prediction error by addition of family background variables that represent an adjustment for specification error. Focusing on socialization gives logical precedence to variables representing background factors. In this case, a *mobility effect* reduces prediction error by the addition of current status variables to the regression equation.

This dissertation employs a general functional form for the fertility-mobility association: the CES (Constant Elasticity of Substitution) Production function commonly encountered in the economics literature (Bridge, 1972). The motivation for this form is its potential for measuring the degree of interaction between current and past variables and so characterizing a *mobility effect.*

The CES function may be represented by:

$$Y = a\ (b\ X_t^r + (1-b)\ X_{t-n}^r)^k = a\ GM(X)^v$$

$$k = v/r \qquad (2.11)$$

where v corresponds to a scale effect on fertility which does not differentiate between the effects of (say) high status in the past or the present, and where r is a power determining the way of status observations are to be averaged. The parameters b and r identify a general mean (GM) (Weerahandi and Zidek, 1979) corresponding to a harmonic mean (r = -1), a geometric mean (r = 0), or an arithmetic mean (r = 1). Similarly, if r tends to plus or minus infinity, GM(X) will be the maximum or minimum observation. Consideration of two limit cases demonstrates the usefulness of the parameter r:

(a) as r tends to 0.0 then the equation approaches to $y = a(X_t/X_{t-n})^{bv}\ X_{t-n}^v$;

(b) as r tends to infinity, the equation takes limit forms $Y = cX_t^v$ or $Y = dX_{t-n}^v$.

The limit cases correspond to extremes of time orientation: given limit (b) status influences on fertility are anchored in time by one or other reference status; whereas, limit (a) represents fertility as a response to a geometric average of status levels (or, equivalently, to the ratio of current and past status levels - a direct measure of the average rate of mobility over the career).

The parameter r is central in the results presented in later chapters. Only if an estimated r were large in absolute value could we conclude that one status has exclusive influence on fertility (i.e. status change could not matter). Given form (b), there would no basis for choosing the present or past as the source of the influence. Similarly, limit (a) has alternative forms, which either resemble an inertial lagged response or an incremental mobility response.

The coefficients v and b provide an indication of marginal fertility differences and the incremental fertility response to status, respectively. The magnitudes of mobility effects are unambiguously represented by b.

These associations between fertility and status are most appropriate when status variables are interval or ratio scale rather being a discrete set of categories. Easterlin proposes measurement in terms of relative income. Leibenstein considers income (directly observed) as well as more general status measures. The literature most directly derived from Blau and Duncan (e.g. Bean and Swicegood, 1979; Stevens, 1981) generally use measures associated with occupational ranking and with mean levels of education and of income observed within occupations. The use of similar occupational status scores in this dissertation provides comparability with the literature based on Blau and Duncan's work.

An extended version of the fertility equation presented above will be the focus in the Results chapter. The extension involves occupational status at three stages of the status career. These are: (a) O status in the family of origin (father's status at respondent's age 16); (b) E status at the time of labour force entry (first job); and (c) S status a the time of the survey. The sociological literature on social mobility, following Blau and Duncan(1967), has generally supported the distinction between status acquired by *ascription* or *inheritance* and status acquired by own efforts (i.e. *achieved status*). This distinction, and its potential impact on fertility, will be studied by identifying *ascription* (O->E) and *achievement* (E->S) components in the fertility equation. The extended form of the equation is:

$$Y = a(bS^{r} + (1-b)E^{r})^{k1} \; (cE^{q} + (1-c)O^{q})^{k2}$$

$$k1 = v/r$$

$$k2 = v/q \qquad (2.12)$$

The implications of this generalization are:

(1) the anchor for background reference status could be origin family status (O), entry status (E) or an average of the two;

(2) two types of mobility or inertial effect are considered - intergenerational and career or ascribed and achieved.

2.5.3. Mobility and the Individual Career

As was noted in section 2.2, the earliest discussions of social mobility-fertility associations described low fertility as a pre-condition for social advancement. Berent (1952) noted the difficulties in establishing a causal direction for the association, *a priori*. Leibenstein (1976) emphasized parity specific effects and the commitment of as-yet-unearned income establishing a potentially motivational influence of fertility on mobility.

The existence of associations between parents' status and that of their children complicates the interpretation of fertility response equations because responses may be direct and/or indirect. Budget-like constraints on the allocation of time, income or effort towards completing goals (e.g. family formation or social mobility, Westoff (1953) p.404) reinforce the idea that the mobility and fertility responses are jointly determined.

Blau and Duncan (1967) initiated research in this area, through the development of their *Status Attainment* model. The model uses occupational status indexes (Duncan, 1961) to estimate status associations between generations and within careers.

The basic element of the *Status Attainment* model is similar to autoregression of status over generations of a family:

$$S_t = c + d\, S_{t-n} + e_t; \qquad (2.13)$$

where S_t and S_{t-n} are status scores for two generations and e is a residual. The parameter d measures lagged correlation between the statuses of successive generations. This could be regarded as an indicator of status inheritance, but that interpretation that could be misleading (Duncan, Featherman, and Duncan, 1972). A more appropriate interpretation is as a measure of immobility or rate at which a family might break away from its initial status position (Shorrocks, 1978; Conlisk, 1982). The properties of such a model over time may be studied by successive substitution of further lags (e.g. substituting $c_0 + d\ S_{t-2n}$ for S_{t-n}). The lagged correlations would decay geometrically with distance between succeeding generations.

The *Status Attainment* model is generally examined (Blau and Duncan, 1967; Duncan, Featherman, and Duncan, 1972) in a more elaborate form than that presented above, but with the same essential features. One point of elaboration is the distinction between *ascribed* and *achieved* status represented by regression of current status both on parental status and on status at the time of labour force entry. In this case, correlation operates over two types of time intervals, the generation and the career.

The time series interpretation of the mobility models allows alternative forms of fertility effect on mobility. Direct incorporation of fertility terms in the *Status Attainment* model (i.e. in regressions on current status levels) corresponds to a fertility effect as the incremental status gain or loss associated with children. Alternatively, fertility effects may be interpreted as influencing the momentum of the on-going process of status change. As such fertility effects would be added sources of variability in the lag correlation term (e.g. as determinant of parameter d, rather than of status).

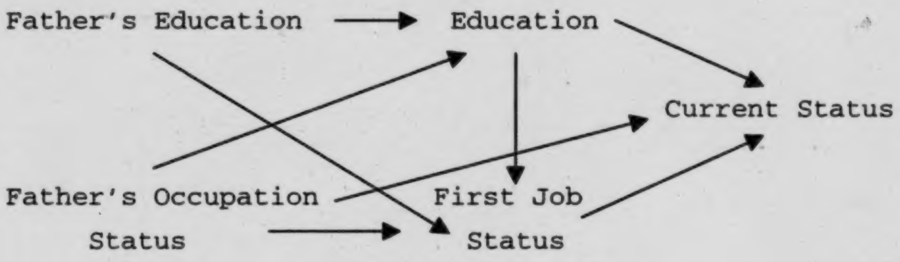
Duncan, Featherman, and Duncan (1972) outline a theory of mobility that emphasizes the progression of an individual through at least three distinct stages of a *socioeconomic lifestyle*. These stages roughly correspond to: (1) family, (2) education, and (3) job. The stages provide for three classes of explanatory variables, regarded as determining *achieved* status level. The classes comprise:

(1) background variables, representing the associations with family of origin (including parental status, parental education and *ascribed* factors like ethnicity, race, and religion);

(2) intervening variables, representing the mechanisms

which permit status to be transmitted and individual factors which might influence such transmission (including education, intelligence or scholastic aptitude, motivation and peer influences (Hauser, 1969, 1971)) and
(3) career contingencies, representing the effects of decisions made which have a direct bearing on occupation (for example, choice and timing of the first job, migration and residential choice, marriage and fertility).

The following path diagram illustrates the basic structure of Status Attainment models:



Study of career contingencies such as fertility involves the addition of relevant variables to this basic structure. The results that Duncan et al report from their analysis of marital fertility as a career contingency are ambiguous with respect to both sign and significance across age groups. They conclude that there is little aggregate association, but qualify this conclusion by stating:

"Presumably, the sequence of events leading up to the observed association between these variables includes a set of complex reciprocal influences between successive increments to family size and decisions to accept or change jobs" (Duncan, Featherman, Duncan, 1972, p.244).

This qualification is augmented by the comment that "detailed life history or longitudinal data" are required to examine the issues.

It is relatively easy to conceive of either negative or positive effects of fertility on mobility. But positive or negative incremental effects of fertility on status are not as easy to imagine. For example, might different children have different kinds of effects or might the addition of a child to the family really result in a status gain/loss expressible as a certain number of status units? An improved specification of the equation is one expressing the impact of fertility on mobility in terms of the rate of status change:

$$\log(S/E) = c_0 d_0 + c_1 d_1 + c_2 d_2 + \ldots + c_n d_n + b_1 X_1 + \ldots + u \quad (2.14)$$

where S denotes current occupational status, E denotes status at labour force entry, $d_0, \ldots, d_n$ are dummy variables representing parity and $c_0, \ldots, c_n$ denote the incremental (inhibitory or motivational) influence of each birth on the net chances of mobility. Additional explanatory variables (X) include accepted determinants of status (i.e., status of origin, intergenerational mobility, years of education, etc.). This equation provides the basis for the examination of effects of fertility on mobility presented in Chapter IV.

2.6 Summary and Conclusion

The published research on the association between social mobility and fertility reveals an area of study whose established theoretical terms of reference are inadequate and in which findings have been interpreted all too casually. Table 2.6.1 summarizes theoretical positions taken from the literature. It would appear that one or a synthesis of more than one of these positions could accommodate any research finding.

It has been admitted that the direction of the relationship can not bee determined a priori (Berent, 1952; Blau and Duncan, 1967) and that it may not be uni-directional at all (Duncan et. al., 1972; Namboodiri, 1974a). Nevertheless, the selection of fertility or mobility as dependent variable has generally been guided by data availability or by consideration of comparability with other analyses pursued for other purposes (e.g. in the context of the examination of career contingencies in *Status Attainment*).

Of the theoretical frameworks considered in Section 2.4, many focus on normative explanations of mobility effects on fertility. Such explanations seem to require categorical status variable definitions, since no one proposes continuously varying norms that are associated with interval scale status concepts. But even so, it is merely attribution to suggest that fertility contrasts and inter- or intra-generational status cross-classifications are linked because of putative norms. The logical and empirical relations between occupational status scores and material conditions of life (Goldthorpe and Hope, 1972) do not support a categorical interpretation of status. Among the theoretical perspectives current in the literature, only the Easterlin *Relative Income* hypothesis seems to have a sound theoretical link between observations (social status) and theoretical constructs (levels of living experienced, and tastes for the maintenance of those levels). The strength of Easterlin's argument derives from the fact that while it has individual socialization as its base (as do the others), but is not restricted to abstract, fertility-specific norms. The weaknesses of Easterlin's theoretical approach are two-fold: (1) Timing effects and preferences are not considered in sufficient detail. Specifically, inter-generational status gains eventually imply the financial resources to support a desired standard of consumption or a relatively larger number of offspring. However, the financial demands associated with children begin before their birth and immediately represent the commitment of as-yet-unearned income. The desired standard of living may be associated with the level that the previous generation was able to maintain after the difficulties of the initial period family formation were over (i.e. at the time of the subsequent generation's adolescence). In Leibenstein's terms, higher fertility will be associated with a higher commitment ratio (i.e., reduced discretionary income). Higher fertility may also be associated with material loss regardless of upward mobility. Precisely because the returns from mobility are distributed over time and the demands from fertility begin immediately.

(2) The perpetuation of status across generations leads to difficulty in distinguishing between socialization and non-socialization effects. The effects can only be identified by some philosophical fiat. Ben Porath does this by stipulating that decisions are made on the basis of contemporaneous internal states, and that apparent socialization effects can only be regarded as corrections for inadequate contemporaneous measurement.

TABLE 2.6.1 - Outline of Theoretical Frameworks

MOBILITY EFFECTS ON FERTILITY

Fertility Variable	Mobility Variable	Predicted Effects or Direction (+/-)
BLAU & DUNCAN		
Children Everborn	Income Change Intergenerational	No Prediction Measurement of Current Demand is Inadequate
BEN PORATH		
Children Everborn	Income Change Intergenerational	No Prediction Measurement of Current Demand is Inadequate
EASTERLIN		
Children Everborn	Relative Income Intergenerational	+ (Current Income Controlled)
LEIBENSTEIN		
Parity Progression	Uncommitted Income (Change Within Career)	(a) + Low Parities (b) - High Priorities (Current Income & Tastes Controlled)
NAMBOODIRI		
Parity Progression	Income (Change Within Career)	No Unambiguous Prediction Reciprocal Effects Power & Family Decision Making are Involved
WESTOFF		
Children Everborn	Status Change (Occupational Class or Prestige Score) Intergenerational	- (Marginal Fertility Differences Controlled)

Putative fertility effects on mobility can be specified as either direct incremental effects on status level or as momentum effects on the correlation between present and previous status. The incremental effects option is discarded, since it would require an underlying relationship between births and job opportunities or offers. There are no known mechanisms for such a relationship. The hypotheses that fertility might influence mobility motivations or add complexity to a job search seem in accordance with an interpretation as a momentum effect. The latter can be specified in terms of multiplicative effects on the proportionate status gain ratio - a direct measure of mobility.

In conclusion, the current opinion that the SMF is a dead issue is premature. Some aspects of the negative results reported may be simply explained as a consequence of poorly conceptualized models (e.g. non-additive mobility effects in the context of a Status Attainment model). Other aspects of the hypothesis have not been subject to adequate empirical test.

CHAPTER 3

DATA AND CHARACTERISTICS OF THE SAMPLE

3.1 Introduction

The data employed in this dissertation were obtained from the Carleton University Data Archives. They represent the outcome of a national survey, undertaken in July 1973, which was intended to contribute to the study of occupational and educational change in Canada (Boyd and McRoberts, 1974). The study, termed the CARMAC study, was designed to be comparable to earlier American studies (Blau and Duncan, 1967; Featherman and Hauser, 1975, 1978). Statistics Canada collected the data as a supplement to the monthly Labour Force Survey (LFS), so that the design characteristics are those of the LFS. The target population was the non-institutional Canadian population aged 18 years and over, who were not full-time students.

3.2 Data Collection and Organization

The LFS is a monthly multi-round survey of Canadian households, employing a multi-stage clustered stratified design (Methodology of the Canadian Labour Force Survey, Statistics Canada, Catalogue 71 - 526, 1976). Data are collected from households located in each of the provinces, independently; while households in the territories and located on Native Indian reservations are excluded. Data collection among provinces can be regarded as ten independent surveys. Stratification involves initial identification of economic regions within provinces and secondarily, identification of urban and rural areas within the economic regions. The population in rural areas is deliberately over-represented in the sample, in order to adjust for sampling and data collection difficulties encountered in such areas. Further stratification involved identification of collections of clusters (Primary Sampling Units) representing sub-areas having relatively homogeneous populations as regards characteristics relevant to the collection of labour force data (e.g. industrial occupational composition) as determined from Census data. Sampling involves the random selection of clusters and of households within clusters. Once selected, a household is repeatedly observed for a period of six months.

Data collection for the CARMAC study employed a supplemental drop-off questionnaire, for which interviewer assistance was provided in cases of difficulty. The household sample size was approximately 35,000 with a response rate of about 78%. Given that the survey occurred in July, vacations were a major contributing factor to non-response (Boyd and McRoberts, 1978) implying a certain type of selectivity bias linked to non-response. More generally, non-response is known to be linked interview order and with highly mobile population sub-groups (as related to age, sex, and employment status) (Statistics Canada, 1982). The latter might be less of a difficulty in the present analysis, where attention is focused on more stable married members of the population.

The questionnaire included 75 questions covering personal characteristics and labour force history as well as characteristics and history of the respondent's mother and father (a complete listing is found in Boyd and McRoberts, 1974). Of special concern, here, were the questions referring to respondent's current occupation, first full time job (after completing education), father's occupation (about the time the respondent was aged 16), respondent's level and years of education, father's and mother's educational level, respondent's current marital status, the year of the respondent's current or first marriage, international and internal migration of the respondent and parents, place of birth of the respondent and parents, number of live births and numbers of older and of younger brothers and. sisters. Additionally, questions were asked about the respondent's language (first learned, ability or use of the official language, use on the job or at home, etc.), ethnicity (of ancestors or currently perceived) and religion. Economic variables were represented by current and past experience of unemployment, usual hours of work and current personal income. Motivation for the choice of questions was in part comparability to American studies and in part representation of the unique features of Canadian society (Boyd and McRoberts, 1974).

The data employed in the analysis comprised a 10% sample of the survey data (obtained by systematic selection of the first case in each block of the computer data tape). Thus, the number of cases analyzed was 4487 drawn from the sample of 44,867 individual responses (not the number of households in the sample). All of the analyses in this dissertation employed the Base Weight (i.e., the design weight with no adjustment for non-response) scaled to sample size.

3.3 Characteristics of the Sample and of Selected Variables

The descriptive characteristics of the sample are of interest in their own right. Comparison with corresponding 1971 Census characteristics (where possible) may provide an indication of the overall quality of the data. Some difficulties in making appropriate comparisons exist, because the reference population employed in this study is a subset of the LFS (i.e. the currently married LFS population currently in the labour force and aged 17-64).

The first indication of non-representativeness in the sample is observed in the comparison of the sex ratio (males to females married and in the labour force) with the corresponding census ratio: 2.59 versus 2.35, respectively. The problem was that, prior to the 1976 re-design, the LFS did not fully capture part-time work of married women (Statistics Canada, 1976). As a consequence, the female sample will not be fully representative of married female labour force participation.

A further indication of discrepancies between female and male samples is provided by their occupational status characteristics: (represented by father's occupational status (ORIGIN), status at first job (ENTRY), current status (STATUS), and a synthetic individual score (BIND) - each of which represents a weighted composite of education and income levels (Blishen and McRoberts, 1976).

TABLE 3.3.1 - OCCUPATIONAL STATUS

	MALE		FEMALE	
	Average	SD	Average	SD
ORIGIN (O)	33.4	12.7	34.1	12.9
ENTRY (E)	36.5	13.9	42.3	12.6
STATUS (S)	41.5	14.6	43.6	13.1
BIND	42.8	17.1	37.2	14.6

SD - Standard Deviation

As may be seen, the ORIGIN Averages for males and females are similar, as they should be if they have a common parent population. A difference emerges at ENTRY, which is subsequently reduced in STATUS observations. These results are consistent with males and females entering different labour markets that have different career advancement characteristics. Such labour market differences are reflected in comparisons of occupational distributions.

TABLE 3.3.2 - SAMPLE AND 1971 CENSUS OCCUPATION DISTRIBUTIONS

	CARMAC SAMPLE		1971 CENSUS	
	Male %	Female %	Male %	Female %
Managers	6.4	2.8	5.5	2.0
Professions	8.6	20.3	9.8	17.6
Clerical	6.1	30.4	7.6	31.8
Sales	9.9	9.6	10.0	8.4
Service	7.5	19.1	9.4	15.3
Other	61.5	17.8	57.7	24.9

Census proportions are of all persons in the labour force.

Given that the census tabulations include the unmarried, corresponding census and sample proportions appear to be in close agreement. The distinguishing feature of the male distribution is a concentration in the Other category (including manual and blue-collar occupations). Females are disproportionately concentrated in Clerical, Service, and Professional (teaching) groups.

Measures of mobility may be obtained by forming the ratios of appropriate status scores (i.e. intergenerational - E/O, intra-generational - S/E, and total - S/O).

TABLE 3.3.3 - STATUS MOBILITY STATISTICS

	MALE			FEMALE		
	Average	SD	MSE	Average	SD	MSE
E/O	1.16	0.46	0.014	1.34	0.56	0.028
S/E	1.20	0.39	0.011	1.08	0.31	0.016
S/O	1.32	0.52	0.016	1.38	0.54	0.029

SD - Standard Deviation MSE - Average’s Standard Error

Comparison of male and female mobility averages suggests that a difference between the sexes exists at entry and then closes over subsequent careers. Source’s of these differences in experience could involve (1) recent growth in the Canadian Service Sector providing a demand driven advantage to females on entry (into traditionally segregated occupations?) and (2) that the comparison father’s status to daughter's status may not be as appropriate as to son's (given occupational segregation).

Other comparisons do not tend to indicate an early career advantage to females, or confirm the impression that they may be disadvantaged in the post-entry career. Individual level status scores (BIND) indicate a substantial difference favouring males. This difference is confirmed by the comparison of male and female income levels.

TABLE 3.3.4 - MALE AND FEMALE INCOMES

	MALE	FEMALE
AVERAGE	$7-8000	$3-4000
MEDIAN	$7-8000	$2-3000
MODE	$8-9000	$2000 or less

Yet, comparison of average years of education (males: 10.8 ± 3.6, females: 11.0 ± 3.0) would tend to suggest that on the basis of qualifications without regard to educational specialization, females should expect equal incomes to males. The educational difference observed here is also present in census data. These differences in qualifications and rewards are consistent with the more extensive work done with these data in connection with labour market discrimination against women (Boyd and Humphreys, 1979). Further indications of differences in labour market experience are provided by the proportions experiencing periods of unemployment lasting one or more years (males: 12.2%, females: 54.4%). Care must be exercised in interpreting the latter, since responses may not be consistent with the definition of unemployment (i.e. periods of active job search). The difference between the average number periods of three or more months of unemployment experienced is equally large (males: 1.4; females: 4.2). However childbirth and childcare could account for much of this difference. It is noteworthy, that labour market experience contains a marked difference (average years of males: 21.1; of females: 9.9) favouring males. The latter can not be explained in terms of simple age differences (average age of males: 40.9; of females: 38.0). In conclusion, it would appear that male and female experiences are markedly different, so much so that no unqualified comparison of their activity or success ought to be undertaken.

A more basic assessment of data quality can be based on the comparison of sample and census age distributions.

TABLE 3.3.5 - AGE DISTRIBUTIONS

	CARMAC SAMPLE		1971 CENSUS	
AGE	MALE %	FEMALE %	MALE %	FEMALE %
20-24	7.0	15.9	6.9	11.7
25-29	14.9	14.1	13.7	14.4
30-34	12.9	9.6	13.1	12.7
35-39	13.0	11.6	13.2	12.3
40-44	12.0	16.1	13.1	12.1
45-49	11.2	11.3	12.5	11.9
50-54	11.7	11.3	10.5	9.6
55-59	9.3	6.0	9.4	7.9
60-64	6.7	2.8	7.4	5.7

Census figures are for husbands and wives in Husband-Wife families.

The differences between male sample and census distributions are minor and might in part be attributed to marriage and/or labour force entry of a part of the baby boom cohort in the two years between these observations. The female differences are marked, but are in the direction that might be expected from the interaction between child rearing and labour force participation.

Ethnicity, by its nature, should be less sensitive to marriage and labour force differences than other characteristics. The census/sample comparison of ethnicity distributions is in Table 3.3.6.

TABLE 3.3.6 - ETHNIC GROUP DISTRIBUTIONS

ETHNICITY	CARMAC SAMPLE		1971 CENSUS	
	MALE%	FEMALE%	MALE%	FEMALE%
British	45.5	48.9	45.5	44.7
French	21.0	21.8	27.0	26.4
German	7.7	7.7	6.6	6.9
Italian	3.7	3.6	3.5	3.9
Jewish	1.1	0.8	1.6	1.6
Netherlands	2.1	1.4	2.0	2.1
Scandinavian	1.2	1.0	1.9	2.0
Polish	1.5	2.4	1.6	1.6
Ukrainian	2.6	2.4	3.0	3.0
Other (& NS)	13.6	10.1	7.5	7.8

In all cases, except French, census and sample differences seem to be small enough to be within acceptable limits given age, marriage and work-related, self-reporting effects. The French group appears to be under-represented.

Sample and Census observations of educational attainment appear to be in agreement, if allowance is made for the unusually high rates of marriage and labour force growth prevailing in the period.

TABLE 3.3.7 - EDUCATION DISTRIBUTIONS

EDUCATION	CARMAC SAMPLE		1971 CENSUS		
	MALE%	FEMALE%	MALE%	FEMALE%	HEADS%
Elementary	32.3	24.8	28.7	34.2	34.4
Secondary	57.4	68.4	47.8	58.2	51.1
Post-Secondary	10.3	6.8	13.4	7.6	14.5

Male and female census proportions are for members of Husband-Wife families and so include substantial proportions above age 65. The Heads proportion refers to heads of

Husband-Wife families aged less than 65 and who worked in 1970.

Sample CEB distributions compared to children enumerated in Husband-Wife families with Heads aged less than 65 reveal differences that may be attributed to children having left home. There appears to be some indication of fewer reported births in the female than in the male sample. Nevertheless, the averages are similar: 2.7 for the males sample, 2.5 for the females, and 2.0 for the census families. Note that census figures are for the ever-married population and may include a disproportionate number of childless that are more likely to be currently unmarried.

TABLE 3.3.8 - DISTRIBUTIONS OF CHILDREN EVERBORN

CHILDREN	MALE%	FEMALE%	1971 CENSUS%
0	13.5	20.3	24.5
1	17.3	16.2	20.5
2	23.3	20.8	23.6
3	17.6	17.4	15.1
4	10.3	8.7	8.2
5+	18.0	16.4	8.0

A comparison of the numbers of siblings in the family of origin indicates that females appear to come from smaller families of origin (although the average numbers of siblings are similar, 4.7 for males and 4.6 for females).

TABLE 3.3.9 - DISTRIBUTIONS OF REPORTED SIBLINGS

SIBLINGS	MALE%	FEMALE%
0	4.5	5.4
1	11.4	11.4
2	13.9	15.1
3	13.3	14.7
4	10.8	10.2
5	10.6	9.8
6+	35.5	33.4

The consistency of the sample data appears to be high, to the extent that it exhibits no striking and inexplicable differences from comparable census observations. One exception is the apparent under-representation of the French ethnic group in the sample. Comparisons of male and female sample characteristics indicate that the populations of married males and females (who are employed) differ systematically in both their experience and background characteristics.

3.4 Age Patterns of Occupational Mobility

Both fertility and mobility are cumulative processes with the likelihood of events or the expected degree of change increasing with the passage of time. Thus, special features of particular age groups might complicate an examination of cross-sectional relations by regression.

Disaggregation by age is a strategy commonly adopted in regression analysis of fertility data. The justification for the strategy seems strong when the independent variables employed represent population composition effects. For example, rural/urban differences will be influenced by rural/urban migration, so that older ages will be more highly self-selected as regards place of residence.

However, fertility and mobility are both age/time dependent. Mobility may increase as job related experience increases. Chances of further fertility may decline with the age of both husbands and wives. The reciprocal impact of each on the other may be cumulative and especially the influence of children on mobility chances.

Age disaggregation could introduce bias in the estimation of regression relations, rather than removing it. Disaggregation by parity will provide a comparable correction to that expected of age-disaggregated regressions on number of child born.

The question of whether to disaggregate by age is more serious in the case of mobility equations than it is for parity equations. The problem involves whether mobility differences among age groups could represent career related differences or whether cohorts should be modeled as independent groups exhibiting unique characteristics.

Mobility patterns by age may be examined directly using indices representing the likelihood of immobility, upward mobility and downward mobility in each 10-year age group. The indices are derived from mobility tables constructed from grouped status scores. For these purposes, six groups were constructed using grouping cut-points -30, 31-40, 41-50, 51-60, 61-70, and 70+ (the conventional grouping employed for data of this sort - Blishen, 1964; Blishen and McRoberts, 1976; McRoberts et. al., 1976). This resulted in matrix of a father to son (or daughter) flows among categories that have been interpreted as approximate social classes. The mobility indices express the deviation from chance mobility (marginal independence) as a proportion of the maximum possible deviation. Thus, in the case of immobility, the index is represented by the ratio (Po-Pc)/(1-Pc), where Po is the proportion observed on the table's diagonal and Pc is the proportion expected with the assumption of marginal independence. Similar indices may be constructed for upward mobility by considering the sum of upper off-diagonal elements of the flow matrix and for downward mobility by considering the sum of lower off-diagonal elements. The index values for the age group tables are provided in Table 3.5.1, together with approximate standard errors (Bishop, Fienberg, and Holland, 1972, pp. 395-397). Positive values may be interpreted as indicating a greater than chance proportion, while negative values indicate that the proportion is less than would be expected by chance.

These indices reveal the dominating effect of concentration on the diagonal of the flow matrix. As a consequence, the indices display excess immobility (i.e. positive indices) and corresponding shortfalls in both upward and downward mobility (i.e. largely negative indices). The standard errors of the indices are too large to support any suggestion of upward mobility being more or less common than downward mobility. Recall that these indices represent excess/shortfall relative to random flows that are constrained to match both first and second-generation marginal status distributions. As such, the indices are adjusted for historical changes in economic structure. The latter have resulted in increases in educational requirements demanded of employees and in increases in standards of living. The indices do not suggest that corresponding status increases did not taken place (Table 3.3.3 displays average status increases). Rather, the indices suggest that there has been greater than chance immobility given the status increases that occurred.

TABLE 3.4.1 - SUMMARY MOBILITY INDICES BY AGE AND BY SEX

- Status Agreement between Generations

AGE	MALE		AGE(z)	FEMALE		AGE(z)	SEX(z)
	INDEX	SE		INDEX	SE		
IMMOBILITY INDICES							
< 25	0.0238	0.054	--	0.3746	0.070	--	3.97
25-34	0.3016	0.063	3.35	0.1485	0.063	-2.40	-1.72
35-44	0.2322	0.038	-0.94	0.0719	0.066	-0.84	-2.10
45-54	0.1322	0.038	-1.86	0.1700	0.066	1.05	0.50
55-64	0.1808	0.038	-0.90	-0.0786	0.076	-2.47	-3.05
UPWARD MOBILITY INDICES							
< 25	0.0728	0.149	--	-0.2432	0.155	--	0.79
25-34	-0.1322	0.054	-1.29	-0.1047	0.259	0.46	0.10
35-44	-0.1372	0.079	-0.05	0.0142	0.269	0.32	0.54
45-54	-0.0393	0.051	1.04	-0.0448	0.237	-0.16	-0.02
55-64	-0.1278	0.092	-0.84	0.4560	0.310	1.28	1.81
DOWNWARD MOBILITY INDICES							
-25	-0.0640	0.051	--	-0.1839	0.063	--	-1.48
25-34	-0.1727	0.025	-1.91	-0.0958	0.076	0.89	0.96
35-44	-0.0969	0.029	1.98	-0.1075	0.079	-0.11	-0.13
45-54	-0.0589	0.019	1.10	-0.1391	0.070	-0.30	-1.11
55-64	-0.0845	0.035	-0.64	-0.0706	0.070	0.69	0.18

AGE(z): z-score for the difference between successive ages

SEX(z): z-score for the difference between males and females of the same age

Minor differences between successive ages suggest that the case for analysis of mobility-fertility relations with cohort disaggregation is not strong. It is not possible to dismiss cohort specific factors. However, the mobility indices do not appear to be strongly influenced by such factors. There is considerable stability in the mobility chances of different age groups. In the case of males, what age-dependency there is could be associated with career plateaux. In the case of females, age differences may be linked with own-career success, husband's career success and/or the labour force choice. Thus it appears to be justified to conclude:

1. cross-sectional cohort comparisons of mobility are inevitably be confounded with on-going mobility; and
2. disaggregation by parity is more pertinent to the present analysis than age or cohort adjustments.

The rate of advancement through either reproductive or occupational careers may be related to the age of the individual. But, the principal concern of this dissertation is to examine associations between the two rates (with age only providing a convenient means of distinguishing between individuals who otherwise have the same achievement levels).

CHAPTER 4

MOBILITY-FERTILITY RELATIONS

4.1 Introduction

The results of an empirical examination of SMF are presented in this chapter. The presentation will be organized as follows:

(a) Sections 4.2, 4.3, and 4.4 will concentrate on aggregate reciprocal mobility-fertility relations. These sections attempt to describe the association between mobility and expected children everborn (E(CEB)), to identify the direction of reciprocal effects and to determine whether the empirical results satisfy the conditions required for an intergenerational cycle.

(b) Sections 4.5 and 4.6 provide parity specific details on the estimated fertility responses to both status variables and the control variables employed in alternate specifications.

(c) Sections 4.7 provide detail on the control variables employed in the assessment of mobility responses to fertility.

(d) Section 4.8 provides an overview of the results and concluding remarks.

4.2 Aggregate Level Fertility Responses

Following from the discussion of the fertility equation specification in Chapter II (especially Section 2.5.1) and Chapter III and Appendix B, the results of the fertility equation estimates may be aggregated to represent the effects of status and status change on E(CEB).

4.2.1 Time Reference in Fertility Response to Status

A mobility effect, as described in section 2.5.2, involves identifying an interpolated reference status for fertility response. The fertility response might be interpreted in terms of adaptation to conditions in the reference status. If the reference status were the current status, then the rate of adaptation might be regarded as infinitely rapid. If the adaptation rate were near zero, then a permanent inertia in fertility response would be indicated. The rate of adaptation is indicated by the curvature in the interpolation line between successive observed statuses (represented by the parameters r or q, Section 2.5.2: equation 2.12).

An alternative interpretation of the interpolation is possible in terms of strength of socialization. Depending on the relative strength of socialization, the reference status may change more slowly than actual status does. If socialization strength is sufficiently high, then the reference status might be permanently anchored at the origin status. Correspondingly, if socialization strength were weak, then the reference status might represent a status that is intermediate between origin and current status.

The concepts of adaptation rate and socialization strength are complementary. The former takes a present-oriented view of responses and the latter is past-oriented. Both identify mobility effects with low or negligible curvature in the interpolation line between status observations ordered by time period.

Estimates of the CES power parameters, obtained from various alternative models and aggregated to the E(CEB) level, are presented in Table 4.1. These estimates distinguish between the Intergenerational and Career mobility stages of the status attainment process. The associated t-ratios test the hypothesis that the estimates do not differ significantly from zero.

The results presented in Table 4.1 provide a clear indication of a differential fertility response to status at more than one point in the lifecycle (the acceptance of the null hypothesis corresponds to acceptance of the mobility hypothesis). In nearly every case, a model of the form:

$$E(CEB) = aO^{b1} E^{b2} S^{b3} \text{ (other variables)}, \qquad (4.1)$$

is preferred to the simpler forms:

$$E(CEB) = aO^{b} \text{ (other variables)}, \text{ or}$$

$$E(CEB) = aS^{b} \text{ (other variables)}. \qquad (4.2)$$

The interaction model (equation 4.1) requires modification in cases that include special confounding factors. The Male Birth Order model includes parity specific parameters related to the number of older and of younger siblings in the family of origin. These parameters were included to study the effect of fertility in the first generation on fertility in the second. However, they are have an additional impact on mobility between adolescence and the first job. Blau and Duncan (1967), Duncan et.al. (1972) and others have found that status immobility is not equal among siblings. Within family inequalities could arise despite efforts of parents to make the most equitable use of their limited resources in preparing their children for later life. Depending on the timing of births and the rate that older children mature, there would be differences in the family resources available for each child at a given stage. Thus, intergenerational mobility effects may be confounded with direct consequences of previous generation fertility.

TABLE 4.1 CES POWER ESTIMATES

Aggregate (E(CEB)) Level

Model	Estimate	t-ratio	df	Significance
Males				
Intergenerational				
Base	-18.887	0.018	2507	0.49
Groups	1.749	0.391	2228	0.34
Birth Order	-0.538	1.975	2238	0.02
Bind	55.226	0.382	2448	0.35
Within Career				
Base	0.278	0.786	2507	0.21
Groups	15.391	0.340	2228	0.36
Birth Order	-1.630	0.808	2238	0.20
Bind	-33.151	0.703	2448	0.24
Females				
Intergenerational				
Base	1.839	0.123	623	0.45
Groups	0.590	1.356	572	0.08
Within Career				
Base	-0.159	3.911	623	0.00
Groups	-1.038	4.797	572	0.00

The special characteristics of Female Career mobility require cautious interpretation of empirical results. The logic underlying the use of the CES functional form is most justified if the careers feature uninterrupted labour force participation. To the extent that female labour force participation is more complex than that of males (e.g. a male partner's lack of success may be a motivation for participation, etc.), it may be that own career mobility plays less of a role for females. However, recall that females appear to have, on average, experienced less career mobility than males (Table 3.3.3). The failure of career mobility to induce a fertility response could merely reflect the relative absence of such mobility.

In summary, the models tested support SMF to the extent that the preferred models include more than one status anchor point. There are exceptions to that conclusion, with regard to intergenerational mobility in the Male Birth Order model and with regard to Female Career mobility.

4.2.2 The Significance of Fertility Responses to Status

An assessment of the significance of status involves a decomposition test statistics comparing marginal fertility response to status, contrasts between responses to status at different lifecycle stages and interactions between stages. Such a decomposition can be constructed using Wald chi-squared statistics (X^2) which correspond to a hierarchy of linear combinations of the coefficient estimates:

$$X^2 = (Db)^t \ (D^tVD)^{-1} \ (Db), \qquad (4.3)$$

where b is the coefficient vector, V is the estimated coefficient covariance matrix and D is a hypothesis design matrix. These statistics may be calculated for each parity level and summed across parities to obtain an aggregate (E(CEB)) level test (see Appendix B for details on the construction and interpretation of tests). Table 4.2 presents the chi-squared significance tests of aggregate level fertility responses to status obtained from the various models examined.

The interaction tests presented in Table 4.2 do not give unqualified support to a general mobility hypothesis. For males, the results justify tentative acceptance of the hypothesis only in the Bind and Birth Order models. Moreover, the results of tests of lifecycle stage contrasts appear to favour quite different simplifications in the latter two cases. The following equations represent the forms most consistent with the results of the significance tests on the two male models:

$$\textbf{BIND: } E(CEB) = aS^{b3}\ (BIND)(GROUP\ VARIABLES) \tag{4.4}$$

$$\textbf{BIRTH ORDER: } E(CEB) = aO^{b1}\ E^{b2}\ S^{b3}\ (BIRTH\ ORDER\ EFFECTS) \tag{4.5}$$

These preferred models point to the need for careful consideration of control variables when considering the mobility effect.

4.2.3 Intergenerational Fertility Responses to Mobility

The results presented in Tables 4.1 and 4.2 indicate that in most cases, at the aggregate level, interaction tests are not significant or the corresponding parameter estimates are small. These results support the multiplicative form as a reasonable approximation of male fertility responses to status at a series of lifecycle stages:

STATUS RESPONSE FORM:

$$E(CEB) = aO^{b1}\ E^{b2}\ S^{b3}\ (OTHER\ VARIABLES) \tag{4.6}$$

The estimates corresponding to equation 4.6 are found in Table 4.3. An alternative decomposition representing responses in terms of proportionate status mobility measures (Me = E/O, Ms = S/E) is:

MOBILITY RESPONSE FORM:

$$E(CEB) = a\ O^{(b1+b2+b3)}\ Me^{(b2+b3)}\ Ms^{b3}\ (OTHER\ VARIABLES) \quad (4.7)$$

Estimates corresponding to this equation are also found in Table 4.3. Status Responses and Mobility Responses distinguish between characterizations of response as anchored to particular status conditions and characterizations of a response continually adjusted to changing conditions.

Results in Table 4.3 are consistent with an interpretation of the socialization process that focuses on the status for which parents prepare their children, rather than the status which parents actually occupy. That conclusion follows from the observation that Entry Status and Intergenerational Mobility effects are particularly strong. Relating this to the Easterlin hypothesis, it would appear that the fertility reference status is not a parental status. Thus, fertility response to status may involve increasing expectations (i.e. for mobility or for consumption). However, it is impossible to distinguish between the effects of individual expectations and expectations of the parents which may be passed on to the children over the course of socialization in the home.

TABLE 4.2 SIGNIFICANCE TESTS ON FERTILITY RESPONSE TO STATUS

(1) GENERAL EFFECTS

MODEL	MARGINAL EFFECT		LIFECYCLE CONTRASTS		INTERACTIONS	
	X^2	df	X^2	df	X^2	df
MALE						
BASE	101.4	6 **	67.8	12 **	24.0	12 **
GROUPS	64.3	6 **	35.7	12 **	30.1	12 **
BIRTH ORDER	23.8	6 **	56.5	10 **	12.1	10 ns
BIND	79.9	6 **	16.1	11 ns	19.0	11 *
FEMALE						
BASE	12.7	6 **	9.6	12 ns	17.8	12 *
GROUPS	5.8	6 ns	10.1	12 ns	21.4	12 **

(2) EFFECTS BY LIFECYCLE STAGE

MODEL	INTERGENERATIONAL				WITHIN CAREER			
	CONTRAST		INTERACTION		CONTRAST		INTERACTION	
	X^2	df	X^2	df	X^2	df	X^2	df
MALE								
BASE	31.9	6 **	13.0	6 **	18.9	6 **	14.6	6 **
GROUPS	22.9	6 **	22.2	6 **	23.1	6 **	18.4	6 **
BIRTH ORDER	26.3	5 **	7.7	5 ns	10.1	5 *	8.1	5 ns
BIND	6.6	6 ns	15.5	6 **	21.3	6 **	9.2	5 *
FEMALE								
BASE	12.5	6 **	15.4	6 **	2.0	6 ns	4.8	6 ns
GROUPS	9.0	5 ns	12.6	6 **	5.3	6 ns	9.1	6 ns

** 0.05>p, * 0.10>p>0.05

- Interactions differentiate within the mobile category
- General contrasts compare stage effects to the marginal effect
- Stage contrasts compare successive stage effects

For males, the importance of Entry Status is demonstrated by comparison of Intergenerational Mobility and Career Mobility coefficients. High entry status will generally have involved years of education, while prolonged higher education may delay marriage or the initiation of family formation within marriage. Thus, the effect of Entry Status reflects concrete effects of proximate determinants of fertility response. Therefore, no direct interpretation of intergenerational mobility effects in terms of socialization can be accepted without some qualification.

TABLE 4.3 - MULTIPLICATIVE AGGREGATE FERTILITY RESPONSES TO STATUS AND MOBILITY

- Alternative Decompositions -

STATUS RESPONSES MODEL	ORIGIN STATUS	ENTRY STATUS	CURRENT STATUS
MALE			
BASE	0.019	-0.781	-0.249
GROUPS	-0.231	-0.183	-0.587
BIRTH ORDER	0.194	-1.724	0.771
BIND	0.008	-0.558	-0.630
FEMALE			
BASE	1.105	-0.619	-2.161
GROUPS	2.107	-0.895	-2.197

MOBILITY RESPONSES	ORIGIN	INTERGENERATIONAL MOBILITY	WITHIN CAREER MOBILITY
MALE			
BASE	-1.011	-1.030	-0.249
GROUPS	-1.001	-0.770	-0.587
BIRTH ORDER	-0.759	-0.953	0.771
BIND	-1.180	-1.188	-0.630
FEMALE			
BASE	-1.675	-2.780	-2.161
GROUPS	-0.985	-3.092	-2.197

- derived from CES parameter estimates evaluated at the median

Estimates of male fertility responses give credence to a variant socialization perspective. Entry status may often coincide with aspirations of the parents. Fertility response anchored to any other status would not be consistent with shared parent and child aspirations, which could be interpreted in terms of socialization effects. The prominence of entry status also favours the extended Easterlin Hypothesis (Easterlin, Pollak, and Wachter, 1980) which takes peer group influences into account.

Typically female labour force participation is more complex than is male participation. The significance tests applied to female fertility response are equivocal, but generally appear to support the view that current status is less relevant than in the case of males. Female-specific factors which must be considered in evaluating the results include: (a) that origin status could influence marriage decisions and choices regarding future labour force participation and (b) entry status may be an indirect indicator of labour force attachment.

Change in the structure of the labour force, as it involved female participation (see e.g. Mcvey and Kalbach, 1995), may have been important in determining the extent to which strictly personal preferences influence the choice between fertility and a career. Growth in the Service Sector of the Canadian economy after World War II substantially increased the opportunities for participation within traditionally female dominated occupations. Thus, the relatively greater female Intergenerational Mobility response, as compared to that of males, may have involved expanded opportunity.

The findings regarding fertility responses to marginal status and to intergenerational mobility are consistent with elements of Easterlin's hypothesis; subject to the qualification that socialization in the home may lead to consumption standards that do not correspond to the levels experienced in the home. The negative response of fertility to increased status or intergenerational mobility supports Easterlin's contentions.

4.2.4 Control Variables and Fertility Response to Intergenerational Mobility

The differences among the estimates produced by the various models arise from differences in the control variables included. Details of the specification of the models are provided in Appendix B, but a general outline of these differences is as follows:

(a) The Base models incorporate only status variables and a marriage duration control variable.

(b) The Group models augment the Base by the inclusion of a range of group membership factors comprising age, nativity, religion, linguistic group and rural-urban background.

(c) The Bind model augments the male Groups model by addition of a single factor that represents a synthetic individual (within occupation) status score.

(d) The Birth Order model augments the male Base model by addition of dummy variables identifying each older and each younger sibling.

Aggregate level estimates of the fertility responses to major control variables are found in Table 4.4, together with a correlation measure of goodness-of-fit. For males, the Bind and Birth Order models fit better than the other models. However, the Bind model involves the addition of 6 parity specific parameters to the Base model. And 142 additional estimates were made in the Birth Order model. Improvement in R^2 adjusted for the degrees of freedom gives a more appropriate assessment of these models. The Birth Order model exhibits an adjusted increase in goodness-of-fit of 0.17. The Groups variables provide an adjusted increase of 0.07, while the addition of the parity specific BIND coefficients provides a further gain of 0.03. The significance of the BIND effect is indicated by a chi-square of 25.3 with six degrees of freedom. On the basis of these findings, it appears justified to focus attention on the male Bind and Birth Order models.

TABLE 4.4 - AGGREGATE FERTILITY RESPONSES TO MAJOR CONTROL VARIABLES

MODEL	CONSTANT	MARDUR	AGE	SIBLINGS	BIND	R^2
MALE						
BASE	3.658 (0.664)	0.780 (0.569)	--	--	--	0.11
GROUPS	4.514 (1.164)	1.592 (0.142)	-1.023 (0.202)	0.040 (0.022)	--	0.20
BIRTH ORDER	4.024 (0.066)	0.931 (0.851)	--	--	--	0.33
BIND	4.621 (1.123)	1.591 (0.158)	-0.778 (0.180)	0.010 (0.022)	0.691 (0.478)	0.23
FEMALE						
BASE	4.535 (1.439)	1.167 (0.117)	--	--	--	0.17
GROUPS	12.270 (0.351)	4.065 (0.218)	-4.673 (0.304)	--	-0.095 (0.038)	0.39

Values in parentheses are asymptotic standard errors

VARIABLES
CONSTANT - intercept
MARDUR - time since current marriage (log)
AGE - at the time of the survey (log (AGE-17))
SIBLINGS - number of siblings in the family of origin
BIND - synthetic status (Blishen) score (log)

GOODNESS-OF-FIT - R^2 - proportionate reduction in uncertainty relative to the average parity progression ratios

4.2.4.1 BIND Model Results

The Bind model shows little difference from the Groups model in terms of responses to the major control variables.

However, estimated Intergenerational Mobility and Status responses are influenced by addition of the BIND variable to the Groups equation. The resulting change is from a relatively inelastic fertility response to elastic one (i.e. coefficients first estimated to be less than 1.0 are subsequently estimated to be greater than 1.0). Consider this result taking into account the conceptual basis for the BIND variable. As noted in Chapter III (and in section 2.2 of Appendix B), status variables are constructed by a linear combination of average income and education levels within occupational groups. By analogy, the BIND variable is constructed with the same linear combination of an individual's educational achievement and income at the time of the survey. Thus, the BIND variable should encompass both occupational and individual factors. Consequently, it provides a basis for distinguishing between group and within group status effects. The motivation for this distinction is similar to that presented in Stevens (1981), but this approach has more in common with Turner and Gartrell (1978) who study individual differences in competence.

In spite of the relation between the BIND variable and current occupational status, the Bind model provides stronger evidence of WITHIN CAREER contrasts than does the Birth Order model. Inclusion of an individual, as opposed to a group, status score may provide a stronger test of socialization effects. That would follow if occupational status scores were appropriate proxies for group average conditions of life, consumption standards and the like. Consequently, the combination of a negative Intergenerational Mobility (socialization?) response and a positive BIND (consumption?) response may be interpreted as supporting Easterlin's hypothesis.

4.2.4.2 Birth Order Model Results

It is assumed that the sibling dummy variables in the Birth Order model will provide an adjustment for two special types of effect:

(a) Families of origin differing in size will differ in investments that they are able to make in their children's education, etc. The Birth Order model provides for different Intergenerational Mobility opportunity.

(b) Older children in a family might share the parenting role with their parents in respect to younger siblings. Then the Birth Order model makes an adjustment for experience of and perhaps tastes for children.

The consequence of the addition of the Birth Order variables is to localize negative responses in ENTRY STATUS more strongly than in other models. This result reinforces the view: (a) that negative status responses are associated with socialization effects, rather than with differential opportunities and (b) that these socialization effects are relatively independent of factors directly related to fertility preferences. The latter is especially important to Easterlin's theory, since his concern is with the question of whether or not fertility decisions must trade-off with consumption decisions.

4.2.4.3 Female Results

A comparison of the Base and Groups equations for females provides an indication of a serious distortion of the results in the Groups model as a consequence of multicollinearity. The responses to the variables MARDUR and AGE, as well as the CONSTANT, appear to be inflated in comparison to both the male models and the female Base model. This is sufficient to call into question the findings for females. In order to apply the analysis to females, it was necessary to consider only females currently in the labour force (i.e. those who have valid occupational status scores). To the extent that female labour force participation involves a considerable degree of choice, there is a risk that a highly homogenous sample results from self-selection. Thus, the presence of multicollinearity might be an indication of specification problems rather than of data deficiencies. In some cases, high female status can be a direct indication of individual preferences that favour a career over fertility. In some cases, presence in the labour force may be a choice made in consequence of fertility (i.e. it may have involved unexpectedly negative experiences, or it may have led to unanticipated constraints on family resources). In either case, mere presence in the labour force may be associated with unusually homogeneous fertility. Those observations, coupled with the greater complexity of female labour force participation over the life cycle, suggest that it is inappropriate to attempt to construct simple models of female status and mobility responses. There are, necessarily, more factors involved than is the case for males; since, in addition to the question of whether to be in the labour force or not, female decisions might take place in response to male labour market performance.

4.2.5 Within Career Fertility Responses to Mobility

From a socialization perspective, fertility responses to mobility cannot be interpreted independently of intergenerational mobility. Even if we view the process as one of continuous adaptation, important changes in the process take place after labour force entry: (1) plans or expectations of status gains must be re-evaluated in light of actual achievement and (2) responsibility for the success of the career plans is focused more directly on each individual rather than the family. Thus, the adaptation process is more highly constrained after entry. An upwardly mobile male who experiences unanticipated success could not assume that future mobility would continue at the same rate. Similarly, a male who experiences an initial failure would not necessarily anticipate a career that would continue to fail. Presumably, an intrinsically conservative and rational response to current experiences would be reinforced as experience accumulates. These hypothetical responses of a male to within career experience have features analogous to the Permanent Income Hypothesis of consumption (Leibenstein, 1976).

For males, status responses are generally independent of their particular family background (Table 4.3), but are strongly influenced by the social fact of status differentiation. The contrast between ORIGIN STATUS RESPONSES and ORIGIN MOBILITY RESPONSES, as presented in Table 4.3, can be interpreted as measuring, respectively, response to parental status and response to status in general. However, the form of response to *ascribed* as compared to *achieved* status appears to be sensitive to the other control variables present in the equation. The Birth Order equation produces a positive response to the CURRENT STATUS variable. The Bind equation includes a similar positive response, but it is associated with the BIND variable, rather than with the CURRENT STATUS variable. In both cases, a positive fertility response appears to emerge after control variables are introduced which effectively focuses on individual rather than status group characteristics.

The low absolute magnitude of WITHIN CAREER MOBILITY coefficients as compared to INTERGENERATIONAL MOBILITY coefficients might be an indication of a higher level of inertia in responses to career status change. This fact may reflect increasing costs of children that are already present (i.e. as parents gain status, they may feel obliged to increase the level of investments in existing children). Leibenstein would also argue that inertia reflects the degree to which fertility choice is progressively constrained (Leibenstein, 1980).

For females, WITHIN CAREER mobility effects are large and negative. Fertility is disproportionately reduced in response to career advancement. This may reflect a predisposition of many of the women found in the labour force, in this time period, to prefer their career to fertility. However, the fact of mobility may simply reflect conditions that preclude fertility. In order to be upwardly mobile, women would have had to invest at least as much effort as men and more, to the extent that discriminatory barriers are present in the labour market. Consequently the identification of highly mobile women may amount to the identification of women who have not had intermittent careers and consequently would be women who are less likely to have been reproductively active. In these terms, the coefficient could not, properly speaking, be a fertility response. Rather, high status mobility would be an indicator of low fertility without any causal relation implied.

4.3 **Within Career Mobility Response to Fertility**

Details of the specification of the WITHIN CAREER MOBILITY equations are discussed in Appendix B. However, certain points require emphasis. Foremost is the manner in which fertility variables were incorporated. Assuming that, over the career, mobility and fertility should have reciprocal relations, then observed fertility levels will be correlated with the random component of the WITHIN CAREER MOBILITY variable. Consistent regression estimates may be obtained by a Two Stage Least Squares procedure. This procedure amounts to the substitution of reduced form estimates of fertility variables for the observed values in the mobility equations.

The fertility variables employed were derived from reduced form estimates of log (CEB + 0.5) - the constant 0.5 was added so that the logarithm would not be undefined for childlessness. Fitted values were used to obtain estimates of the expected parity of each individual. Parity contrast variables were constructed to examine differences in mobility between:

(1) CHILDLESS - with and without expected children,
(2) SIZES - with expected parity above and below 4 in the non-zero parity group,
(3) SMALL - between parities in the small size group,
(4) LARGE - between the remaining parities (up to 8+) in the large size group.

Estimates of fertility effects on mobility are presented in Table 4.5. The implied consequence of the presence of children for occupational mobility is a negative one, even supposing that mobility influences fertility. The estimate associated with an expected parity one represents a special case - to the extent that family formation, if it takes place at all, does not often end at the first child as a matter of choice. Achievement of parity two corresponds to a substantially negative mobility effect for both males and females. Thereafter, the partial effects associated with subsequent parity levels are mixed. For parities three and four, the effects of additional children on mobility appear to be marginally less negative than was the parity two effect. Presuming that parents are able to anticipate these negative effects, higher parity decisions appear to be less crucial than was the initial decision to have one or two children.

Undoubtedly, the presence of children is associated with constraints on an individual either in taking advantage of opportunities for advancement that present themselves or in seeking out such opportunities. However, such constraints are unlikely to be the sole source of the initial negative effect. Other constraints associated with children involve arise because, as the family increases in size, family decisions will be concerned with the welfare of a larger number of individuals. The marginal effect of additional children will increase the complexity of welfare decisions and, perhaps, add inertia to decision-making. At the outset, family formation requires adjustment to a new set of social roles and responsibilities. The effects of low parity

TABLE 4.5 - FERTILITY EFFECTS ON MOBILITY

Incremental (Added Child) Effect Estimates

CEB	MALE	FEMALE
1	0.0068	0.0148
2	-0.1065	-0.1338
3	-0.0823	-0.0561
4	-0.0370	-0.0599
5	-0.0458	0.1868
6	-0.2436	-0.0697
7	-0.0366	0.3049
8+	0.6185	-0.2453

Family Size Mobility Contrasts - t-ratios

CONTRAST	MALE	FEMALE
CHILDLESS	0.315	0.217
SIZES	3.549 **	0.806
Small		
1-2	2.989 **	2.646 **
2-3	1.827 *	1.438
3-4	1.486	0.057
Large		
5-6	5.446 **	2.791 **
6-7	14.705 **	0.830

Incremental Fertility Effect Variance Ratios

	MALE	FEMALE
F-ratio	9.405 ***	6.082 ***
Numerator df	7	7
Denominator df	825	189

Dependent Variable - log (CURRENT STATUS/ENTRY STATUS)

* 0.1>p>0.05, ** 0.05>p>0.01, *** 0.01>p

fertility confound the constraints directly associated with the first children and the effects of a change in lifestyle. Adjustment to the new role could involve formation of new social networks (e.g., forming friendships because of need to combine childcare with leisure activities, by need to change residence, etc.). These adjustments may absorb an individual's time and efforts in a way that is not true of subsequent fertility decisions.

Fertility need not only act as a constraint on mobility, it can also be a motivating factor. To the extent that this is likely to be true, it would be expected that positive effects would be particularly evident at high parities. Such effects are not detected in the male equation, except in the case of the open-ended category (i.e. 8+). The latter represents an especially uncertain result rarely attained. In conclusion, the estimates imply negative fertility effects on male mobility at parities most commonly attained.

4.4 Aggregate Mobility and Fertility Relations Between Generations

Aggregate intergenerational relations involving both fertility and socio-economic status can be represented in terms of a (highly simplified) vector autoregressive equation:

$$A\,Y_t = B\,Y_{t-1} + e_t, \text{ or } Y_t = A^{-1}\,B\,Y_{t-1} + A^{-1}\,e_t; \qquad (4.8)$$

where Y_t is the vector of fertility and status observations for the t'th generation. If we assume a positive association (B) between members of the same family-line across generations, then the character of observed intergenerational correlations (i.e., $A^{-1}B$) will be determined by the interaction between the processes of status attainment and family formation (that interaction being represented by A). Somewhat counter-intuitively, the resulting signs of the observed correlations may be opposite to the signs of the interaction coefficients, since:

$$A = \begin{bmatrix} 1 & a_1 \\ a_2 & 1 \end{bmatrix} \qquad A^{-1} = \begin{bmatrix} 1 & -a_1 \\ -a_2 & 1 \end{bmatrix} \Big/ \left[1 - a_1 a_2\right] \qquad (4.9)$$

Much of the interest in Easterlin's approach to the relations between household economic conditions and fertility has focused on the implication that a fertility cycle (with a period of two generations) might be an inherent (Easterlin, 1973; Easterlin and Condran, 1976). It follows that a cycle requires that $A^{-1}B$ contain negative coefficients applying to fertility (i.e., in order that as the separation between generations increases elements of the lagged coefficient matrix would oscillate in sign).

In order to establish that relationship, it would be sufficient to have positive contemporaneous reciprocal effects in A. That is, the processes of status attainment and family formation would have to be mutually reinforcing. However, the estimates presented in this dissertation provide greater support to a characterization of the processes as mutually constraining.

Positive influences of mobility on fertility emerge only in the Bind and Birth Order equations. The construction of the BIND variable suggests that the positive effect must be considered in terms of a mobility contrast within the achieved occupational status group. Similarly, the Birth Order equation effectively compares mobility effects on fertility within birth order groups (i.e. groups which may have experienced similar opportunity).

4.5 **Parity Specific Fertility Responses**

Examining parity specific results permits consideration of Leibenstein's contention that fertility responses (decisions) take different forms depending on the parity at which they take place.

A commonplace characterization of family formation in

Canada might include the following distinct stages:

(1) the decision to remain childless or not - subject to infertility,

(2) rapid progression to parity two - providing children with companionship and/or at least one child of a preferred or of each sex,

(3) the decision to have a third child depending on sex balance and by fertility preferences and

(4) only at the transition between parities three and four might the parents have learned enough about the impact of children to make their decision exclusively on the basis of preferences and constraints.

The important elements of this characterization are two fold. Firstly, couples must learn by experience about the impacts of children on their lives. Secondly, initial decisions may effectively concern pairs of children, while later decisions may concern only one birth at a time. Decisions at different parities may differ in terms of the factors involved, the number of children considered and the manner in which the decision is taken.

Leibenstein (1976) hypothesizes that there will be inertia influencing any decision that requires a substantial change in the household expenditure pattern and that additional children imply a heavy commitment of current income regardless of long term income prospects. His conclusion is that, beyond parity two, differences between status groups in terms of *commitment humps* (i.e. aggregate current expenditure goals that the parents feel it is important to meet) may contribute to differences in the parity at which family formation is terminated. Income and status related constraints, per se, might be almost irrelevant to progression at low parities.

Parity specific status effects are presented in two forms. Firstly, in Table 4.6, actual regression coefficients are represented. Secondly, derived estimates of the CES parameters are presented, in Tables 4.7 - 4.10, representing component effects on the probability of transitions (CONDITIONAL EFFECTS), and representing component effects on the probability of terminating fertility at a given parity (UNCONDITIONAL EFFECTS).

The regression coefficients presented in Table 4.6 are estimates of the relation between the dependent variable and the log of occupational status in the family of origin (ORIGIN), at the time of labour force entry (ENTRY), and at the time of the survey (STATUS), respectively. In addition, estimated responses to the square of the log ratios (corresponding to intergenerational mobility (E/O) and within career mobility (S/E)) are included (see Section 2.2 Appendix B). The coefficients representing Male responses are taken from the Bind and Birth Order equations. Female responses are obtained from the Base and Groups equation.

Each regression coefficient in Table 4.6 has an associated t-ratio below it - except for six of the Male coefficients assigned a standard error 0.0 as a result of collinearity. Sources of collinearity in these equations are of two types. In the Birth Order equation, dummy variables representing younger siblings are negatively correlated with those representing older siblings precisely because many of one implies few of the other. Collinearity between control variables and status variables or among status variables represents features of status attainment in Canadian society within the time period represented in these data.

Tables 4.6 to 4.10 contain estimates representing the three levels at which parity specific effects might be examined: (a) log odds of responses, (b) parity progression ratios and (c) unconditional parity probabilities. It will not be necessary to consider them each in detail, since each represents the same information organized in a somewhat different way.

Unconditional parity probabilities represent the most useful level at which to examine parity-specific effects, since they are most directly related to the E(CEB) level. The latter (Section 4.2.3) suggests that Within Career Mobility should be the focus of attention and that Entry Status corresponds to the basic reference status.

Tables 4.7 and 4.8 provide results for the Male Bind and Birth Order models. In both cases, the adaptation parameter estimates are generally small relative to their standard errors. This suggests that the effect coefficients (c and b) and the marginal status coefficients (v) can be combined to form elasticities of fertility with respect to status (as was done for E(CEB) in Table 4.3). The corresponding elasticities may be found in Table 4.11. The coefficients estimated for the BIND variable are presented in Tables 4.6 and 4.7. These might be compared to the elasticities in Table 4.11.

The pattern of Male marginal status effects shows an increasingly negative relation to odds of birth as parity increases. The same conclusion might not be justified for Females (Tables 4.9 and 4.10 - which provide the corresponding Base and Groups model estimates, respectively).

Within Career elasticities (Table 4.11) represent proportionate changes in parity specific probabilities that might result from upward mobility. These potential changes are assessed relative to the average parity distribution. This pattern of positive and negative parameters would have the effect of flattening the parity distribution in the event of upward mobility or sharpening it in the event of downward mobility.

Female responses, as shown by the Within Career elasticities, appear consistent with a decline in fertility following upward mobility. Low parities, childlessness and parity one, appear to have strong positive coefficients. Results for higher parities are uncertain, as a consequence of sample size. Nevertheless, a strong negative coefficient appears at parity four in both cases.

TABLE 4.6 - ESTIMATED REGRESSION COEFFICIENTS (2SLS)
PARITY PROGRESSION LOG ODDS DEPENDENT

1. MALE BIND EQUATION

PARITIES	ORIGIN	ENTRY	STATUS	E/O	S/E	BIND	df
0-1	0.624	-2.767	1.233	0.557	-5.068	-1.105	717
	(0.81)	(0.93)	(0.35)	(0.47)	(0.73)	(0.61)	
1-2	-1.142	4.444	-8.181	-1.101	7.203	3.969	627
	--	(1.76)	(2.45)	(1.09)	(1.22)	(2.39)	
2-3	-2.305	-0.478	-6.197	1.342	-1.530	5.446	500
	(3.88)	(0.24)	(2.41)	(1.27)	(0.31)	(3.49)	
3-4	-2.508	5.788	-4.106	-2.838	15.780	-0.641	318
	(4.48)	(2.16)	(1.25)	(2.79)	(2.52)	(0.48)	
4-5	-2.890	5.777	-11.698	-3.057	11.433	6.188	182
	(2.89)	(3.53)	(2.43)	(2.12)	--	(2.11)	
5-6	-1.717	1.801	2.017	-1.182	-10.234	-5.855	104
	(0.9)	(0.40)	(0.32)	(0.40)	(0.88)	(1.54)	

2. MALE BIRTH ORDER EQUATION

PARITIES	ORIGIN	ENTRY	STATUS	E/O	S/E	df
0-1	0.818	-2.274	-0.802	0.254	-3.995	660
	(1.32)	(1.21)	(0.40)	--	(1.03)	
1-2	-0.379	-0.656	1.373	-0.988	-0.181	580
	(0.65)	--	(1.77)	(1.35)	--	
2-3	-1.495	-3.359	4.110	0.636	-5.107	455
	(2.69)	(1.88)	(2.69)	(0.66)	(1.21)	
3-4	-0.796	1.321	-0.895	-2.057	8.545	289
	(1.21)	(1.24)	--	(1.92)	(2.78)	
4-5	-1.863	0.453	-0.223	-1.978	2.079	163
	(1.85)	(0.14)	(0.08)	(1.25)	(0.28)	
5-6	0.722	8.886	-14.661	1.899	-6.414	91
	(0.35)	(1.88)	(3.97)	(0.47)	(0.50)	

TABLE 4.6 - continued

3. FEMALE BASE EQUATION

PARITIES	ORIGIN	ENTRY	STATUS	E/O	S/E	df
0-1	1.691	-0.658	-3.536	4.041	0.312	207
	(0.84)	(0.24)	(1.35)	(1.77)	(0.44)	
1-2	3.961	-1.886	-4.338	4.631	7.280	154
	(2.02)	(0.92)	(2.27)	(2.41)	(1.14)	
2-3	-0.057	0.465	-2.324	-1.030	0.275	123
	(0.04)	(0.25)	(1.13)	(0.62)	(0.04)	
3-4	0.41	-2.166	-3.113	5.108	-10.973	75
	(0.41)	(0.82)	(1.14)	(1.81)	(1.15)	
4-5	2.081	1.284	-1.071	-0.957	-0.519	41
	(0.79)	(0.44)	(0.33)	(0.32)	(0.05)	
5-6	9.607	-1.462	-10.845	8.623	-27.291	23
	(1.63)	(0.42)	(1.68)	(1.64)	(1.46)	

4. FEMALE GROUPS EQUATION

PARITIES	ORIGIN	ENTRY	STATUS	E/O	S/E	df
0-1	0.689	0.622	-1.413	2.405	9.871	199
	(0.31)	(0.21)	(0.47)	(0.36)	(0.90)	
1-2	5.019	-2.282	-6.708	6.117	-11.018	146
	(2.10)	(0.83)	(2.33)	(2.42)	(1.14)	
2-3	-0.141	0.064	-2.274	-0.355	-3.426	114
	(0.08)	(0.03)	(0.94)	(0.18)	(0.44)	
3-4	1.284	-1.205	-3.353	5.390	-17.256	66
	(0.45)	(0.33)	(0.84)	(1.49)	(1.38)	
4-5	-0.271	0.355	9.316	-6.955	10.913	32
	(0.05)	(0.07)	(1.30)	(1.24)	(0.45)	
5-6	-20.831	18.262	-3.753	-21.347	142.243	15
	(0.84)	(2.12)	(0.17)	(1.41)	(2.15)	

- values in parentheses are t-ratios
- df denotes residual degrees of freedom

TABLE 4.7 - BIND EQUATION PARITY SPECIFIC MOBILITY EFFECTS - MALE

Evaluated at the Average

PARITIES	0	1	2	3	4	5
A. MARGINAL STATUS EFFECT - (v)						
CONDITIONAL	-0.0928	-0.0892	-0.3437	-0.1415	-0.2593	-0.4413
UNCONDITIONAL	-0.0928	0.0628	0.2102	-0.0194	0.0090	-0.0066
B. INTERGENERATIONAL EFFECT - (c)						
CONDITIONAL	1.6194	-0.9307	-0.3045	-2.4192	-1.2036	0.0852
UNCONDITIONAL	1.6194	-1.6274	-0.4246	8.9332	-7.2759	-17.7230
C. WITHIN CAREER EFFECT - (b)						
CONDITIONAL	-0.1270	7.5824	0.4250	6.4717	4.2013	2.0448
UNCONDITIONAL	-0.1270	9.6889	-0.2429	-18.0347	20.9875	22.6230
D. INTERGENERATIONAL ADAPTION - (q)						
CONDITIONAL	1.1025	-2.0718	3.8244	-0.9355	-1.7577	16.1519
UNCONDITIONAL	1.1025	-1.1791	3.4488	0.4708	-0.6712	-0.0627
E. WITHIN CAREER ADAPTION - (r)						
CONDITIONAL	-70.2611	0.4880	7.0864	1.2151	1.2963	-5.1045
UNCONDITIONAL	-70.2611	0.4010	-11.8099	-0.4744	0.2162	0.9497
F. BIND						
CONDITIONAL	-0.1018	0.5572	1.0593	-0.1237	1.2237	-1.3767
UNCONDITIONAL	0.1018	-0.5188	-0.6645	0.3490	-0.2876	0.7843

TABLE 4.8 - BIRTH ORDER EQUATION PARITY SPECIFIC MOBILITY EFFECTS MALE

PARITIES	0	1	2	3	4	5
A. MARGINAL STATUS EFFECT - (v)						
CONDITIONAL	-0.1040	0.0255	-0.0724	-0.0357	-0.1615	-0.5941
UNCONDITIONAL	0.1040	-0.0421	0.0365	-0.0065	0.0392	0.1224
B. INTERGENERATIONAL EFFECT - (e)						
CONDITIONAL	1.7245	3.2426	-3.0188	-3.3027	-1.2817	1.2858
UNCONDITIONAL	1.7245	2.5488	-4.8934	5.4572	-1.1127	2.3806
C. WITHIN CAREER EFFECT - (b)						
CONDITIONAL	0.7104	8.1243	-11.0484	4.8378	0.2731	5.8029
UNCONDITIONAL	0.7104	4.7360	-15.0916	-41.4019	3.2657	9.0153
D. INTERGENERATIONAL ADAPTION - (q)						
CONDITIONAL	0.3601	1.6079	0.2818	-1.5649	-1.6568	4.0912
UNCONDITIONAL	0.3601	1.6603	0.2292	2.7155	-2.1424	1.2208
E. WITHIN CAREER ADAPTION - (r)						
CONDITIONAL	34.3969	0.0370	-0.2063	4.9754	-25.6516	-0.1822
UNCONDITIONAL	34.3969	-0.1171	-0.1444	-0.1992	0.8010	-0.1235

TABLE 4.9 - BASE EQUATION PARITY SPECIFIC NOBILITY EFFECTS FEMALE

PARITIES	0	1	2	3	4	5
A. MARGINAL STATUS EFFECT - (v)						
CONDITIONAL	-0.1153	-0.1706	-0.1863	-0.4282	0.2268	-0.3174
UNCONDITIONAL	0.1153	0.1317	0.0710	0.1473	-0.2164	-0.0022
B. INTERGENERATIONAL EFFECT - (c)						
CONDITIONAL	2.3512	4.5007	0.9405	1.3790	-0.8143	8.1163
UNCONDITIONAL	2.3512	4.8487	-1.5844	0.7426	0.7980	-216.9336
C. WITHIN CAREER EFFECT - (b)						
CONDITIONAL	2.8254	3.8338	2.4259	1.4029	-0.9337	8.0333
UNCONDITIONAL	2.8254	3.9971	1.4828	0.4960	0.9035	-195.7263
D. INTERGENERATIONAL ADAPTION - (q)						
CONDITIONAL	2.0328	0.5195	38.4267	8.8089	1.1295	0.2212
UNCONDITIONAL	2.0328	0.4536	-2.7014	-27.6970	-18.7368	-0.0071
E. WITHIN CAREER ADAPTION - (r)						
CONDITIONAL	0.0967	-1.1844	0.1660	-17.4983	0.5012	-0.7156
UNCONDITIONAL	0.0967	-1.2548	11.5486	52.3946	42.6302	0.0335

TABLE 4.10- GROUPS EQUATION PARITY SPECIFIC MOBILITY EFFECTS FEMALE

PARITIES	0	1	2	3	4	5
A. MARGINAL STATUS EFFECT - (v)						
CONDITIONAL	-0.0047	-0.2993	-0.2286	-0.3159	0.9294	-0.7432
UNCONDITIONAL	0.0047	0.2677	0.0952	0.0739	-0.4892	0.2333
B. INTERGENERATIONAL EFFECT - (c)						
CONDITIONAL	14.5097	3.5278	0.8801	1.7844	1.0577	-5.5900
UNCONDITIONAL	14.5097	3.4922	-1.2405	0.9751	1.3295	-5.6546
C. WITHIN CAREER EFFECT - (b)						
CONDITIONAL	27.7057	3.3785	1.9345	2.0483	1.9821	1.1873
UNCONDITIONAL	27.7057	3.2995	0.5829	0.9317	2.1279	0.9386
D. INTERGENERATIONAL ADAPTION - (q)						
CONDITIONAL	0.4811	0.6909	5.7218	4.7051	48.5306	-0.3666
UNCONDITIONAL	0.4811	0.6751	-2.3970	-422.8708	7.8101	-0.3512
E. WITHIN CAREEN ADAPTION - (r)						
CONDITIONAL	0.5232	-1.3811	-3.2244	-9.8190	-2.3855	404.7483
UNCONDITIONAL	0.5232	-1.6332	25.0011	-645.9365	-2.6438	-1496.4976

TABLE 4.11 - UNCONDITIONAL PARITY SPECIFIC MOBILITY ELASTICITIES

- Estimated as vb from Tables 4.7 - 4.10

MALES

PARITY	BIND	BIRTH ORDER
0	0.0118	0.0739
1	0.6085	-0.1994
2	-0.0511	-0.5508
3	0.3499	0.2691
4	0.1889	0.2691
5	-0.1493	1.1035

FEMALES

PARITY	BASE	GROUPS
0	0.3258	0.1302
1	0.5264	0.8833
2	0.1053	0.0555
3	0.0731	0.0689
4	-0.1955	-1.0410
5	0.4306	0.2190

The results from Male data are especially important, since they contradict one of the criteria that might be associated with a definition of a *mobility effect*. Specifically, an effect of mobility, per se, should represent a response that is consistently in the same or the opposite direction to mobility (i.e. should be monotone). Consequently, the finding that both low and high parities are positively associated with mobility, but intermediate parities negatively provides a qualitative basis for rejecting the mobility hypothesis. The latter pattern shows that the variance of the distribution of CEB is positively associated with upward mobility.

4.6 Fertility Response to Control Variables

4.6.1 Male Birth Order Effects

The Birth Order model involves addition of 142 dummy variables to the complete set of parity equations. These variables provide for estimates of the differences in parity specific fertility response between individuals who had differing numbers of older and of younger siblings. That is, for each parity, a contrast is made between persons with 1 older and 0 younger siblings and all other persons, between those with 0 older and 1 younger sibling and all others, and so forth for each combination of older and younger siblings.

The general pattern of response to the Birth Order variables is displayed in Table 4.12. This table represents the predicted E(CEB) by size of family of origin and by the respondent's birth order within that family. The estimates were obtained by summing estimates for the appropriate numbers of older and of younger siblings (i.e. combining all possible older-younger siblings numbers consistent with a given family size). The marginal E(CEB) estimates were then obtained by adding the Birth Order estimates to the equation intercept.

The pattern of response described by these estimates is unexpectedly complex. It appears to be necessary to distinguish among three types of response: (1) those of the youngest, (2) those of the oldest and (3) those of intermediate birth orders. The fertility response of the oldest in each of the sizes considered is generally higher than the rest. This pattern could be associated with experience that the oldest sibling gained helping his parents care for his siblings. To the extent that such a *practice* interpretation is valid, it appears to promote fertility. The youngest sibling appears to exhibit the next highest level of fertility. Clearly, a different type of explanation is required for the lowest birth order.

TABLE 4.12: MALE E(CEB)

BY BIRTH ORDER AND ORIGIN FAMILY SIZE

Adjusted for Status Variables and MARDUR

SIZE /	YOUNGEST					OLDEST
2	2.668	3.298				
3	2.770	1.941	3.610			
4	2.916	2.044	2.254	4.120		
5	2.923	2.199	2.356	2.763	3.593	
6	5.158	2.197	2.502	2.866	2.236	3.471

The pattern of response also resembles *sibling-crowding* effects of a type reported in Lindert (1978). These effects may be due to differential advantages of birth order positions in terms of resources available or quality of childcare or partially due to practice effects influencing older siblings. Regardless, the net result seems to be an association between fertility and birth order in the first generation and fertility in the second generation. It appears that the E(CEB) of a given birth order and family size is greater than for corresponding birth orders of smaller family size. But, as Lindert found in examining sibling differences in care, opportunity, etc., birth order rather than family size, per se, is the dominant factor.

The finding that marginal fertility differences are greater among birth orders than among family sizes limits the role that may be attributed to fertility habits or tastes transmitted across generations within families. Focusing on inequalities within families instead raises questions that are unlikely to have any cultural or normative content. Unless we are willing to entertain norms or persistent cultural practices (like primogeniture) which systematically discriminate among birth orders.

4.6.2 Groups Control Variables

Table 4.13 provides estimates of the aggregate effect of control variables from the Male Bind and Female Groups equations on E(CEB), together with a chi-squared statistic representing the overall significance of the sets of regression coefficients on which the estimates are based. Detailed discussion of the effects is, however, limited to those effects that have been identified as important (i.e. significant at the 0.05 level).

The results presented in Table 4.13 provide a strong indication of the very poor quality of the estimates of Female equations. In part, these results may be explained by: (1) the absence of female labour force choice equations at repeated choice points over a female career and (2) small sample size (which is in part a consequence of (1)).

TABLE 4.13- AGGREGATE (E(CEB)) CONTROL VARIABLE EFFECTS

VARIABLE	MALE	x^2	df	FEMALE	x^2	df
AGE	-0.7778	37.91	6 **	-4.6730	15.45	6 **
MARDUR	1.5909	119.26	6 **	4.0653	30.20	6 **
BIND	0.6914	25.28	6 **	-	-	-
SIBS	0.0104	10.93	6 *	-0.0950	10.14	6 ns
RNAT	-0.1418	5.88	6 ns	0.7089	3.27	6 ns
MNAT	0.0216	11.57	6 *	0.4794	6.38	6 ns
REL	-0.0694	10.30	5 *	-0.0566	6.43	6 ns
LANG	-0.2911	23.94	6 **	1.9080	0.33	6 ns
R X L	0.1948	3.25	6 ns	-1.7592	0.28	6 ns
FRUR	-0.1585	23.92	5 **	-0.2741	7.76	6 ns
RRUR	-0.2266	62.81	5 **	2.1983	0.89	6 ns
F X R	0.6229	45.55	5 **	-	-	-

** 0.05>p, * 0.10>p

4.6.2.1 **Duration Effects**

Duration effects (AGE and MARDUR in Table 4.14) represent the only controls that are equally successful in both Male and Female equations. They also present the least interesting effects. MARDUR simply controls for duration of exposure to risk. AGE corresponds to one or more of the following effects: (a) the biological limit of reproductivity, (b) a cohort trend in fertility or (c) an experience adjustment to Status Attainment effects.

Parity specific estimates of the effects of duration factors on the unconditional distribution of family sizes appear to be very systematic for Males and reasonably so for Females.

TABLE 4.14 - DURATION EFFECTS ON UNCONDITIONAL PARITY PROBABILITIES

PARITY	MALE AGE	MALE MARDUR	FEMALE AGE	FEMALE MARDUR
0	0.0490	-0.3382	0.2578	-0.6593
1	0.0219	-0.1600	-0.6541	0.4688
2	0.1609	-0.0848	0.2109	0.0124
3	-0.1099	0.2586	0.0037	0.0520
4	-0.0076	0.0441	-0.0704	0.1820
5	-0.1523	0.1937	-0.8341	0.5375

AGE and MARDUR are expressed on a log scale and a constant (17) has been subtracted from each reported age so that the scales will be approximately the same for both variables. Consequently, a cohort effect corresponds approximately to the sum of AGE and MARDUR effects. This sum would generally be negative for low parities and positive for high parities (for both Males and Females), consistent with a conditional duration effect and/or a secular cohort trend tending towards reduced family size.

Positive high parity MARDUR effects may be interpreted as direct effects of duration of exposure to risk. Then, AGE effects might be associated with low fertility levels experienced in Canada during the depression (i.e. 1930-40), since older respondents in the sample (i.e. those aged 50-65) would have been near their reproductive prime about that time. Thus, the AGE effect is consistent with the fertility trend observed between the depression trough and the post-war baby boom.

4.6.2.2 Urban-Rural Differences

The existence of urban-rural fertility differences represents a frequent finding in fertility research (Andorka, 1978). The theoretical perspective that most readily fits in the present context is that the costs of child rearing are lower in rural areas. Consequently, a given budget will not limit family size to the same extent it would in an urban environment. Similarly, female labour force participation and related factors (e.g. availability of daycare facilities) might have direct importance. Limited rural opportunities may lead to generally lower levels of budget constraint (by eliminating alternatives and by lowering the associated *shadow price* of children).

Table 4.15 provides estimates of Urban-Rural differences based on estimates of contrasts between place of residence in the first and second generations and the interaction between the two for Males (each contrast is highly significant - see Table 4.13). These results provide an indication of an important directional migration effect. The aggregate differences in Male E(CEB) provide an indication of a substantial contrast (about 1/4 of a child, all else being equal) between families that have rural residence and background as compared to families with urban residence and background. However, for families whose background differs from current residence, there are substantial negative effects - with current rural residence representing the greater of the two effects. Parity specific estimates do not provide any contradiction of the aggregate pattern, especially as regards the difference between movers to cities and movers to the country.

TABLE 4.15- FERTILITY DIFFERENCES ACROSS GENERATIONS BY URBAN-RURAL RESIDENCE

1. Differences in Male E(CEB)

Second Generation

	Rural	Urban
First Generation		
Rural	0.2378	-0.1585
Urban	-0.3851	0.0

2. Differences in Male Unconditional Parity Probabilities Parity

3.

		Rural	Urban
0	Rural	-0.1801	0.0220
	Urban	0.0337	0.0
1	Rural	0.1180	0.0495
	Urban	-0.0426	0.0
2	Rural	0.0727	0.0351
	Urban	0.2723	0.0
3	Rural	0.0031	-0.0434
	Urban	-0.0866	0.0
4	Rural	0.0018	-0.0232
	Urban	-0.1026	0.0
5	Rural	-0.0083	-0.0110
	Urban	-0.0433	0.0

In discussing these differences, it must be reemphasized that the choice of the proxy for Rural-Urban residence was initially limited to survey responses indicating either (a) the size of the community of residence at age 16, or (b) an agricultural occupation. The latter was chosen for three reasons: (1) the selection of (a) might have involved significant response and recall-lapse errors, (2) the shift out of an economy dominated by an Agricultural base represents a structural change in the Canadian economy which has important implications for the interpretation of social-mobility effects and (3) the use of (b) provides comparability with previous research (e.g. Blau and Duncan, 1968; Bean and Swicegood, 1979; Stevens, 1981 - in which involvement in the Agricultural sector was partialled out as a special effect).

Therefore, a special social mobility interpretation may be placed on the estimated differences. Rural-Urban moves could be regarded as a special category of upward mobility and negative effects on fertility are consistent with intergenerational mobility effect estimates. Mobility, in this case, arises from limitation of choice to the extent that opportunities in rural areas are restricted by population density and by structural change in the economy leading to a reduction in the agricultural labour force.

4.6.2.3 Language and Religion Contrasts

Henripin (1972) notes in his 1961 Census Monograph on Canadian fertility that language and religion (specifically Roman Catholicism) represent the most important cultural factors influencing Canadian fertility. In contrast, the present results appear to apportion only a minor influence to either and the estimated impacts are not consistently in the expected direction (i.e. relatively high fertility among the groups identified by Roman Catholic religion and/or French mother tongue).

Table 4.16 displays estimates of fertility contrasts between the major religious and linguistic groups at both the aggregate and unconditional parity levels. With social mobility and other factors controlled, at specific parities, the aggregate main effects of both factors are negative and the effect of religion appears to be minor relative to mother tongue. At the parity level, it appears that these cultural factors have little, if any, importance in determining the chances of progressing above parity two.

TABLE 4.16- FERTILITY CONTRASTS BY RELIGION AND MOTHER TONGUE

MALE ONLY

1. Aggregate Contrasts

		Religion	
		Catholic (RC)	Other
Language	French	-0.3605	-0.2911
	Other	-0.0694	0.0

2. Unconditional Parity Specific Contrasts Parity

0	French	0.2480	0.2115
	Other	0.0365	0.0
1	French	-0.2023	-0.1732
	Other	-0.0291	0.0
2	French	-0.0966	-0.0864
	Other	-0.0102	0.0
3	French	0.0337	0.0333
	Other	0.0004	0.0
4	French	-0.0172	-0.0023
	Other	-0.0149	0.0
5	French	0.0006	-0.0071
	Other	0.0077	0.0

The parity pattern of contrasts provides the basis for a subtle interpretive distinction. Given, that high parity contrasts are negligible rather than being either positive or negative, these cultural factors can not be regarded as generally favouring or disfavouring fertility per se. Rather, it appears they represent reduced chances of low fertility, specifically. With hindsight, it seems reasonable to regard these as capturing fertility effects that serve to distinguish Quebec from the rest of the country. Since 1961, Quebec's fertility has moved from a position among the highest observed in the country to among the lowest.

4.7 Mobility Equation Control Variables

Broadly speaking, there have been only two theoretical perspectives from which to consider variations in the rate of individual career advancement. The *Status Attainment* model relates career advancement to social background in terms of concrete or effective barriers to status change between generations. The existence of concrete barriers suggests discriminatory practices in relation to mobility opportunities (e.g. quotas in training programs, etc.). Effective barriers would be associated with aspects of socialization which discourage the pursuit of available opportunities (i.e. concepts related to the *culture of poverty*, etc.). The *Human Capital* perspective characterizes monetary rewards obtained in an occupation in terms of a return on an initial investment in training or in the informal acquisition of productivity enhancing skills. The central characteristics of a *Human Capital* model are education and experience.

Although the two perspectives have frequently been regarded as conflicting, the emphasis that they appear to give to conditions influencing an individual before or after labour force entry could be regarded as complementary. We would regard parents and employers as having independent motives in influencing an individual's career development.

Regardless of these interpretations, mobility related variables function to provide statistical controls for the regression of fertility on mobility. Given the concern that effects may be confounded with unobserved factors, the mobility control variables enforce a plausible degree of homogeneity in the parity groups whose mobility has been contrasted. In this regard, it is not necessary to provide a comprehensive model of the mobility process. It is sufficient to partial out potentially confounding effects.

The most immediate problem involving potential confounding is related to duration effects. Mobility and fertility are processes evolving concurrently over time. The *Human Capital* model has direct bearing on this, since both the years of preparatory investment in education and years of on-the-job experience are predicted to have differential impacts on mobility. Indirect fertility effects may result from a delay in marriage and/or reproductive activity until the completion of full-time training or from a correlation between years spent in the labour force and the duration of marriage. These are critical variables to both processes and are represented in the mobility equations by YED (years of education) and YLF (years of active labour force participation).

The status of family of origin has an empirically established association with both fertility and mobility. Regardless of whether this association arises as a result of differential norms or economic circumstances, its omission would confound fertility contrasts with factors pre-dating reproductive activity. Similarly, an intergenerational mobility variable representing the proportionate mobility at the time of labour force entry and thus capturing the momentum of mobility should also be included.

Additional factors were selected in order to represent the stability of the career pattern. A dummy variable FARM was introduced in order to adjust for the structural changes in the economy which would have directly influenced the careers of those whose families of origin were involved in the agricultural labour force. An ordinal variable PUE measured the number of periods of unemployment since labour force entry and so provided a degree of control for intermittent careers. Another ordinal variable MOVE measured the number of inter-city moves, a proxy for career interruption leading to upward mobility. Each of these variables provides some protection against the possibility that the fertility contrast effects simply identify categories of individuals with atypical career patterns.

The regression results for the mobility equation control variables are presented in Table 4.17. Given that the equation is a part of a system of equations, its error term necessarily includes a component of variance due to the uncertainties associated with fertility. Consequently, a multiple correlation will not reflect the degree of explanation provided by the equation. Nevertheless, a ratio of residual to marginal mean squares (a correlation ratio) provides an approximate upper bound on regression-to-the-mean. For females, this is assessed at 64.9%, while for males it is 37.8%. The result for males represents a very satisfactory fit, given individual level data.

Duration effect estimates indicate that education represents a considerably more efficient means of ensuring upward mobility than does experience. The evidence of a sex difference in returns to either education or experience is weak, since the standard errors for the corresponding coefficients tend to be large relative to the differences between the coefficients.

The negative relation between background status and mobility results from the construction of the status scale and from the use of a proportionate measure of mobility. It indicates that with higher origin status, there will be less scope for additional upward mobility. A similar interpretation may be given to the effect of intergenerational mobility. This serves to indicate that (greater than chance) intergenerational immobility is a common feature of the mobility process in Canada and that it is a feature of careers as well.

Those variables representing sources of instability in the career provided disappointing, although consistent, results. The direction of effects conformed to expectations, but the strength of the effects was generally negligible. A FARM background complicated the mobility process and was generally found to be detrimental to career mobility. Migration was positively associated with status mobility, while unemployment was negatively associated.

In general, the major effects on within career mobility (i.e. the duration and status variables) represent strong associations that are consistent in sign with expectations. The similarity between the estimates for males and females gives them further credence. As a consequence, we may accept that the fertility contrasts presented in Section 4.3 represent contrasts which, being partialled on control variables, display differences between relatively homogeneous groups.

TABLE 4.17- EFFECTS ON WITHIN GENERATION MOBILITY (log(S/E))

Fertility Effects Controlled

VARIABLE	MALE		FEMALE	
	B	SE	B	SE
YED	0.316	0.026 **	0.368	0.064 **
YLF	0.111	0.014 **	0.084	0.022 **
O	-0.352	0.037 **	-0.495	0.089 **
E/O	-0.457	0.032 **	-0.517	0.064 **
FARM	-0.031	0.023 *	-0.089	0.048 **
PUE	-0.003	0.002 *	-0.001	0.002
MOVE	0.007	0.003 **	0.006	0.006
	F-RATIO	DF	F-RATIO	DF
	54.68 **	(14/825)	8.84 **	(14/189)

STANDARD DEVIATIONS

log(S/E)	0.3615	0.2349
RESIDUALS	0.2223	0.1892

* 0.1>p>0.05, ** 0.05>p

4.8 Conclusions

Any direct comparison between the results presented in this dissertation and previously reported results is difficult. This is a consequence of fundamental differences between the concept of a mobility effect as presented here and in contrast to the sense of the term employed in Blau and Duncan (1967).

The Blau and Duncan definition of a mobility effect was implicit and algebraic, rather than being explicit and theoretically based. In this regard, they may have been propagating an error of Berent (1952), in the interests of cross-national comparisons. In any event, their definition of mobility effects on fertility reduces to an identification of *non-additivity* in the unrestricted estimation of marginal current and marginal background status fertility differences.

There are, at least, three basic conditions in which mobility effects could not appear:

(a) fertility responses might be determined by status of origin exclusively (i.e. individual differences are fixed and fertility differences by current status are outcomes of the background status composition of incumbents);
(b) fertility responses might be opportunistic (i.e. there is a static association between status and fertility and status fertility differences would reflect the current status differences among incumbents);
(c) there may be insufficient uncertainty in mobility to induce differences (i.e. there might be a high enough degree of collinearity between current and past statuses to preclude estimation of mobility effects).

The results presented in this dissertation represent an extension of previous research, in that three additional conditions are assumed for a definition of a *mobility effect*:
(d) there must be consistency in the direction of fertility responses to a given direction of status change (i.e. mobility effects are not simply an arbitrary response to change);
(e) marginal fertility differences must also be monotonic in status (i.e. fertility differences between status groups can not be arbitrary, otherwise (d) would make no sense);
(f) reciprocal effects of fertility on mobility must also be considered (this extension is crucial to (c), since such effects could give the appearance of a mobility effect on fertility).

There is little to be gained from direct comparison of the results presented here and previous findings, since:

(1) previous emphasis on interaction terms between current and past status prevents the identification of either monotonic status or mobility effects and,

(2) the theoretical perspectives on which the discussion has generally been based do not (with the exception of Easterlin) have much bearing on the conditions characterizing a mobility effect.

4.8.1 Summary of Findings

The findings presented in Table 4.3 provide a direct indication that Within Career Mobility has an impact on fertility almost as strong as that of Origin status or of Intergenerational mobility. This is net of the effects of fertility on mobility (Table 4.5), which imply that fertility constrains mobility to a considerable degree. Reliable results have been obtained only for males, a result of the greater complexity of female mobility.

Occupational status scores do not appear to provide completely adequate proxies for individual status effects on fertility. This conclusion follows from results for the individual status score BIND and sibling dummy variables. Weaknesses in the proxies used may provide an explanation of inconsistencies in the sign of the Within Career mobility effect. The evidence points to a positive underlying effect, which provides a measure of support for the Easterlin *Relative Income Hypothesis*.

Results obtained for direct effects of Origin Status do not appear to be sufficiently strong to be accepted unconditionally. The consistency between Origin and Entry

Status effects suggests that marginal status effects on fertility are best assessed in terms of status at the beginning of the individual's career. This could correspond to a family background effect determined by aspirations more than by experiences.

Efforts to identify control variables (i.e. influential variables other than status variables) have met with limited success, except in the case of the Birth Order model. It appears that general social categories do not provide the discriminating power, at the parity level, that they appear to provide in regressions on CEB.

The Birth Order model provides some of the most intriguing results. The incorporation of dummy variables representing the existence of siblings older and younger than the respondent was initially motivated to control for fertility correlated along family lines. Instead, the findings indicated a strong distinction between respondents who were the oldest or youngest in their families of origin and all other respondents. The result is consistent with previous findings regarding intra-familial inequalities. The direction of the effects (see Table 4.12) indicates that the Birth Order model contains two types of positive fertility response to status: (1) one that involves the relative advantages (in opportunity?) that the youngest and oldest siblings might have and (2) another associated with subsequent career mobility.

Regardless of the controls employed, parity specific results display similar qualitative forms of status response. Within Career mobility appears to be associated with a low probability of terminating fertility at an intermediate parity (unconditional parity effects - Tables 4.7 and 4.8) and with increased chances of terminating at either higher or lower parities. This result indicates that there could be two modes of fertility response to mobility, which conflicts with the monotone condition for the definition of a mobility effect. Results presented at the aggregate level (mobility effects on E(CEB)) imply that these parity level effects are masked by aggregation. Consequently, previous studies that examined aggregate fertility differences and rejected the mobility hypothesis may have done so for insufficient reason. The present study provides no indication of how to differentiate between the groups or individuals who might have responded to mobility by curtailing or by increasing their fertility.

CHAPTER 5

CONCLUSION

5.1 Substantive Findings and Directions for Further Research

5.1.1 Fertility Response to Mobility

Regression of E(CEB) on status scores implies fertility responses to change in status between career stages. Superficially, this appears to give a strong indication that SMF is supported by the data. However, this result holds only at the aggregate level.

Fertility responses to upward mobility at the parity level may result in either high or low fertility. The direction of fertility response is uncertain, rather than being determined by the direction of status change. This finding calls into question any previous identification of a positive or a negative effect of mobility on aggregate fertility.

At least two alternative interpretations of the results might provide insight. Firstly, the different directions of response might correspond to different (otherwise unidentified) population sub-groups. If this were the case, then it would give a strong indication that the determinants of major swings in fertility have a cultural basis underlying responses to economic factors. Such a conclusion would conflict with common interpretations of the correlation between macro fertility and economic time series. Alternatively, the fertility response might produce increases in both the mean and the variance of the CEB distribution. The mean of the parity distribution could increase or decrease with little change in shape, if mobility were primarily a determinant of the probability of childlessness and had little or no impact on subsequent parities. Empirical results from all parities are more complex than that. There is no uniform direction for parity response to mobility. It may simply be that increased uncertainty (i.e., increased variance) is a characteristic of the response.

In the final analysis, it seems that there is no uniquely satisfactory characterization of what constitutes a mobility effect. The vagueness of SMF may provide a motivation for its abandonment. Alternatively, the vagueness of SMF might provide a motivation for development of competing or complementary behavioural hypotheses at the parity level. At that level, two types of predictions might be considered: (a) conditional predictions of specific parity transitions or (b) unconditional predictions of the complete CEB distribution. Neither type of prediction meshes in a completely satisfactory way with global concepts like the demand for children, family size norms, or desired family size.

5.1.2 The Empirical Status of the Easterlin Model in the Canadian Context

The critical element of Easterlin's model, as it is expressed in Easterlin, Pollak, and Wachter (1980), is the assumption of *endogenous preferences* rather than a specific prediction of the direction of a fertility response to family economic circumstances. The source of these preferences is primarily family background experience (although peer influences are also considered). Thus, the model specifies a socialization effect on fertility and is supported by any empirical results that suggest a differential fertility response to background status with current status controlled. This appears to be established in the Canadian context over the time period of these data.

The *Relative Income Hypothesis* is a special case of the more general *Endogenous Preferences* model. Predictions derived from the former focus on positive fertility responses to relative increases in income. It is important to note that this specific type of response is more closely associated with socialization regarding consumption than that regarding fertility preference and could be characterized as an opportunistic fertility response (i.e., becoming operative only if consumption demands have been satisfied). This prediction has support, in the Canadian context, only when the analysis is narrowly focused on certain within-group comparisons. Positive fertility responses are observed only in association with special individual level variables (i.e. in the Bind and Birth Order models).

Fertility-specific socialization could involve norms regarding appropriate levels of fertility achievement and/or child welfare norms (i.e. standards for child care and their material welfare). The operation of welfare norms might be consistent with Leibenstein's notion of inertia and his predictions of progressively increasing rationality in fertility decision-making as parity increases. Leibenstein emphasizes the intrinsically biased comparison that individuals might make in contrasting their own level of living soon after labour force entry with that which they experienced in their parental home. To the extent that such a comparison might influence fertility choices, it might be incompatible with high fertility. The comparison would contrast the first generation's achievements at an advanced stage in their career with the second generation's achievements at an early stage. The inevitable bias in this comparison leads Leibenstein to anticipate discontinuities in the parity progression response to status and status change. The discontinuities correspond to *commitment humps*. The presence of these humps suggests an association between status and fertility up to a critical parity with no association at higher parities. Support for such effects in the Canadian context seems weak. In these data, associations remain strong, but change sign at critical parities.

A strong indication obtained from these data is that status of the family of origin does not, itself, provide a substantial direct influence on fertility. Its effect is subsumed in status at labour force entry. This result may arise from the socialization of children in the parental home anticipating status mobility. The relatively strong impact of status at the time of labour force entry might represent peer influences as well as parental aspirations. Consequently, status observations on the family of origin may not be necessary to model the major influences of status and status change on fertility. This conclusion further erodes the importance that might be attached to the *Relative Income Hypothesis*.

The results of the Birth Order model suggest that inequalities of opportunity among siblings may be important in determining fertility outcomes. The form of the empirical results resembles the impact of *sibling crowding* on child quality expenditures. These results further weaken support for the *Relative Income Hypothesis*, to the extent that they suggest that predictions regarding fertility responses to career success can not be generalized to all members of the same family of origin.

The most obvious weakness of these results is that analysis could not be carried out at the family level. At a minimum, survey data on individuals could be used to reconstruct families. Analysis of family fertility response could then be attempted, expressed in terms of the characteristics of all individual members. If female labour market and fertility decisions are as contextually sensitive as is supposed, then proper analysis of female mobility-fertility relations will be impossible without this added dimension. The present analysis admits direct interpretation of results for females only if we assume a high degree of status homogamy in order that omitted variable biases (spouse effects) may then be assumed to be small.

The Birth Order results suggest the additional importance of family reconstruction across generations by collection of data linking siblings' families. Such data could address questions regarding intergenerational transmission of fertility tastes or preferences (culture) and the impact of intra-family inequality on second generation fertility responses.

5.1.3 **Mobility Response to Fertility**

The regression model examined in this dissertation was a simple system of structural equations. It provided for more than one type of response (both mobility and fertility) and provided for an association between response types in addition to associations with background variables.

At one level, the use of a structural model serves to generalize the conditions under which fertility responses to mobility are tested. The structural equation model removes the otherwise implicit assumption that mobility is exogenous. This is an essential element of the analysis, even if the study of mobility prospects were not of particular interest, per se. Leaving mobility exogenous would lead to a model in which we attempt an explanation of recent fertility in terms of present status (i.e., explaining the past in terms of the future).

The empirical results for mobility responses to fertility describe shifts in the rate of status change that might be associated with births of successive parities. These shifts correspond to changes in the momentum of career advancement. The results are generally consistent with loss of momentum.

It is instructive to consider, hypothetically, what the implications might have been had the mobility response to fertility been positive. It is an essential difference between the fertility and mobility processes that one can choose to reverse status gains or that they may be transient, but once born children must be cared for thereafter. It is the relative lack of choice and irreversibility implicit in childcare, that makes negative mobility responses to fertility inherently more plausible than positive responses. It is, likewise, this lack of choice that suggests a fertility-mobility association as an underpinning of a culture of poverty.

5.1.4 Directions for Further Research

This dissertation has demonstrated the richness of dynamic analysis of fertility. From this view, dynamics arise in the course of specific career choices and fertility choices made child by child. It has been shown that considerable scope exists at the micro level for dynamic modeling that involves careful specification of both dependent and independent variables. It is difficult to see how analysis of macro level time series or cross-sections can be useful in describing behavioural change, when the behaviours are as complex as these are.

Throughout the dissertation, criticisms have been leveled against analyses of fertility data that make exclusive use of regressions of CEB on selected independent variables. Given the preponderance of such studies in the literature, a particularly important finding has been the complexity of parity specific responses.

The finding that changing individual circumstances might induce both an increase in both expected family size and an increase in probability of childlessness represents a qualitatively different and more complex type of response than can possibly be captured by linear regressions on CEB. Fertility responses should be analyzed as a sequence of contingent responses reflecting the evolution of individual and/or family decisions and adaptation to changing family circumstances. Similarly, allowance must be made in models of career mobility for opportunistic and/or adaptive responses. Models that presuppose immutable lifetime fertility or mobility plans do not accord with empirical facts.

The connection between dynamic models and individual heterogeneity serves to indicate the priority that needs to be given to micro-demographic behavioural research. There is a need for specialized data to support such research. These data would permit reconstruction of inter-generational and/or cross-sibling event histories. The event histories should track the concurrent evolution of fertility, family, education and labour market careers. With richer data, more focused models could be explored. However, respondent recall is the only feasible source of such data. Correspondingly, more focused data and models will bring measurement errors to the forefront of analytical issues.

Difficulties that arise from measurement error include both inaccuracies or bias in respondent recall and special complications of properly representing female mobility. Recall problems concern the accuracy of specific variables (e.g., reported status of family of origin or children everborn as reported by male respondents). Dealing with female mobility requires observation at the family level. This is not because male status could be a proxy used to measure female mobility, but rather because female mobility is inherently multi-dimensional. Issues involving measurement error will have to be addressed by incorporating specialized terms in future response models (a task that was too complex for the present study). However, the challenge that these issues pose reflects a heartening maturity in the research, to the extent that it indicates that research concept are more sharply defined than in the past.

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APPENDIX A

Linear Regression in Fertility Analysis

Many studies of the relation between fertility and sets of explanatory variables are characterized by the linear regression of children everborn (CEB) on the selected independent variables at a micro-level (i.e. utilizing census or household survey data). Least squares estimates of the regression coefficients are obtained from the equation:

$$(X^{t}X)^{-1}\,X^{t}(CEB) = B; \qquad \text{(A1)}$$

where X is the matrix of independent variables and B is the vector of regression coefficients.

The linear regression approach has a number of verifiable statistical properties (e.g. minimum variance, unbiasedness) even without employing distributional assumptions. These properties do not, however, establish that the technique produces estimates that are useful for meaningful interpretation. The unanswered questions are: (1) whether the coefficients (B) are the estimates that we require to improve our understanding of the characteristics of the sample at hand and (2) whether the technique provides statistics (e.g. measures of association) that can usefully be compared to other similar samples.

The dependent variable (CEB) can be decomposed into a matrix product (CEB = DN); where D is a matrix of dummy variables representing each parity (i.e. $d_{ij} = 1$, if the i'th case corresponds to the j'th parity observation; and $d_{ij} = 0$, otherwise), and N represents the parity value (the vector of possible CEB numbers (0, 1, 2,...)). It is meaningful to decompose CEB in this way, because N can be regarded as fixed from sample to sample (it represents the sample space), while D represents the features of the sample. Rewriting the regression equation gives:

$$B = (X^t X)^{-1} X^t DN. \qquad \text{(A2)}$$

This equation may be regarded as embedding two regressions, since:

$$C = (X^t X)^{-1} X^t D, \text{ and } B' = ((N^t N)^{-1} N^t C)^t, \qquad \text{(A3)}$$

where the coefficient matrix C represents the outcome of regressing D on X, and the coefficient vector B′ is the outcome of regressing C on N. The vectors B and B′ differ (in this case) only through division by a known scalar $(N^t N)$.

Re-expression of the regression relations provides a simplified interpretation of its results. Since D contains only dummy variables, the cross-products matrix $X^t D$ must contain grouped sums of the variables in X. The matrix $(X^t X)^{-1}$ can be directly related to a matrix containing the partial correlations between the variables in X (Johnston, 1972). The expression determining B′ implies that the parity group mean $(X_{.j})$ can be expressed as a linear function of parity:

$$X_{.j} = X_{..} + b_j \, (V(X)/(N^t N))_j + e_j, \qquad \text{(A4)}$$

where X.. is the grand mean, V(X) is the variance of X, j is the parity, $\mathbf{b}_j$ is the regression coefficient usually estimated from CEB regressions, and $\mathbf{e}_j$ is a least squares residual.

Linear regression models of CEB on X provide results that are related (in a completely determined manner) to linear trend models representing the expected mean of each X variable in terms of parity. This has the appearance of treating X as the real dependent variable, in much the same way that a Discriminant Function (relating observations (X) to a set of classifications (Y)) can also be viewed as a Multivariate Analysis of Variance on X (with Y as factors). Because of the ambiguity regarding which is the dependent variable in CEB regressions, its usefulness is limited. As with Discriminant Function Analysis, it is concerned with a classification problem. Any causal model of fertility must concern itself with the dynamics represented by parity transition probabilities.

APPENDIX B

Detailed Equation Specification and Hypothesis Tests

B1. Introduction

This appendix provides background to the specification of the equations, the form in which they were estimated, and the form of the hypothesis tests.

B2. Equation Specification

B2.1 Fertility Dependent Variable

The form in which survey respondents provided fertility data was the reported number of children everborn (CEB). Each individual who has reported i births experienced a sequence of i conditionally independent birth events prior to the survey. Consequently, the characteristics of individuals reporting CEB = 2 must be taken into account in considering the chances of a first and a second birth, and will represent a part of the population at risk of a third.

The fertility dependent variable may be represented as a matrix of dummy variables. This matrix (D) comprises row-vectors (one for each individual) in which the first element is coded 0 if CEB = 0, and 1 otherwise; the second element is coded 0, if CEB is less than or equal to 1, and is coded 1 otherwise; and so on. This matrix represents all observed transitions between successive parities up to the sixth.

The corresponding transition probabilities are implied by the non-linear regressions:

$$E(d_{ij}) = \exp(X_i b_j)/(1 + \exp(X_i b_j)) \qquad \text{(B1)}$$

relating the characteristics of the ith respondent (X_i) and the vector of regression coefficients b_j. This relationship is equivalent to the linear form:

$$\ln(P_{ij}/(1- P_{ij})) = X_i b_j \qquad \text{(B2)}$$

where P_{ij} is the expected probability of the transition from ith to jth parity conditional on the characteristics X_i (i.e., $E(d_{ij}) = P_{ij}$ by definition).

Two issues arise in regard to this treatment of the dependent variable. Firstly, it is assumed that no multiple births are present in the data. Secondly, since the intervals between births are unknown, there is a risk that the independent variables may include observations whose timing follows rather than precedes a given birth. The only variables that might be subject to this risk, in this dissertation, have been treated as being determined simultaneously with fertility (i.e., as endogenous).

The fertility equations estimated in this dissertation were not taken beyond the birth of the sixth child. Each equation was based on a progressively reduced sample. That is, the population at risk of the ith birth included only those observed to have had, at least, the i-ith birth. At high parities, the sample was judged to be insufficient for further analysis.

The form of the dependent variable required non-linear regression estimation, this was provided by the Logistic Regression routine BMDPLR in the BMDP(79) computer package. The algorithm employed was based on Iteratively Reweighted

Least Squares, and provided asymptotically Maximum Likelihood estimation under a simple binomial model.

B2.2 The Status Variable Functional Form in Fertility Response Equations

As noted in Section 2.5.2, the functional form employed to represent fertility responses to status variables was a compound CES (Constant Elasticity of Substitution) function. This function is highly non-linear but may be linearized for convenient estimation. The non-linear version is:

$$Y = a(bS^{r} + (1-b)E^{r})^{k1} \; (cE^{q} + (1-c)O^{q})^{k2} \; MARDUR^{d}$$

$$k1 = v/r$$

$$k2 = v/q \qquad \text{(B3)}$$

where S, E, and O correspond to current, entry and origin statuses, respectively. The variable MARDUR represents the duration of the current marriage and provides an essential time interval measure that discounts fertility responses to approximate responses per unit time. For present purposes, the dependent variable Y may be regarded as being the odds of parity transition.

The linearization of the CES form involves a Taylor Series expansion around r=0 and q=0 (Bridge, 1972; Kmenta, 1971). The resulting approximate form is:

$$Y' = h_0 + h_1 O' + h_2 E' + h_3 S' + h_4 (M'_e)^2 + h_5 (M'_s)^2 + h_6 MARDUR'$$

(B4)

where the prime represents a log transform (X' = log(X)) and the variables M_e and M_s correspond to the proportionate mobility measures (E/O) and (S/E), respectively.

The coefficients of the non-linear form are related to the approximate linear form coefficients in the following manner:

$$
\begin{aligned}
h_0 &= \log(a)\\
h_1 &= v(1-c)\\
h_2 &= v((1-b) + c)\\
h_3 &= vb\\
h_4 &= (cv(1-c)q)/2\\
h_5 &= (vb(1-b)r)/2\\
h_6 &= d \qquad \text{(B5)}
\end{aligned}
$$

It is clear that if both q and r are equal to 0.0, then the model reduces to a multiplicative interaction among status variables.

The CES parameters have been identified, in the body of the dissertation, as follows:

v - Marginal Status Effect
c - Intergenerational Effect
b - Within Career Effect
q - Intergenerational Adaptation
r - Within Career Adaptation

The form presented corresponds to the Base model. Each alternative specification involved additional statistical control variables to the Base variables.

The alternative that is simplest to express is the Birth Order model, which can be represented as:

$$Y' = BASE + OS_1 + OS_2 + \dots + OS_{12} + YS_1 + \dots + YS_{13} \qquad \text{(B6)}$$

Where OS_i corresponds to the effect of having an ith older sibling and YS_i corresponds to the effect of having an ith younger sibling. Contrast coded variables were generated automatically by BMDPLR (by identifying the appropriate sibling variables as representing categories). In reporting results for the Birth Order model, the no-siblings combination has been merged with the intercept. Consequently, the results represent those that would have been obtained if dummy rather than contrast coding had been used.

The Groups models involved the addition of selected variables representing observed characteristics of the survey respondents. The definitions and a discussion of these variables has been presented in Section 4.6.2. To reiterate, they comprise Age (log(age-17)), number of siblings (total), nativity (respondent and respondent's mother - contrast coded - Canadian born = -1, Foreign born = 1), religion (RC = 1, not RC = -1), language (Francophone = 1, other = -1), and rural background (respondent and respondent's father - the proxy used represents occupation in agriculture = 1, other = -1). These variables were added to the Base model in the same fashion as in the Birth Order model.

The Bind model differed from the Groups model only by the addition of the log(BIND) variable. The BIND variable is analogous to the status scores employed throughout this dissertation. By way of background, the scores were constructed by regression of a prestige ranking of 204 occupations on the average levels of education and income observed (in the 1971 Census) within each occupation (Blishen and McRoberts, 1976). These scores are termed Blishen scores. By analogy the term BIND represents an Individual Blishen score: they were constructed in a manner identical to Blishen scores, but substituting individual education and income levels for occupational averages.

The equation used to construct the BIND variable was:

$$BIND = 12.33 + 0.3677\ YED + 0.3047\ INC\% \qquad (B7)$$

where YED represents observed years of education, and INC% is the individual's income, at the time of the survey, expressed as a percent of the maximum in the sample. It has been assumed that the resulting score represents the composition of factors already represented by the current status score together with individual or within-occupation-group factors.

All status related variables have been interpreted in this dissertation in terms of their operational definition (i.e. as a weighted composite of education and income). This interpretation may not do justice to the involvement of the prestige factor, however it is operationally valid and it is, in any event, difficult to know how to separate the prestige element from the seemingly more concrete economic elements. Goldthorpe and Hope (1972) suggest that samples of individuals who are given the task of providing prestige rankings find the problem of distinguishing economic from other factors just as difficult (and in practice, do not distinguish).

B3. Fertility Response Hypothesis Tests

The hypothesis tests presented in Table 4.2 provide some of the more key results of the analysis described in this dissertation.

The tests are based on Wald chi-square statistics calculated for each parity and aggregated across parities.

It must be noted that Wald statistics are less powerful than the corresponding likelihood ratio statistics might be, but are considerably more flexible, convenient and less expensive to calculate.

Wald chi-squares have the following form:

$$X^2 = (Dh)^t (D^t VD)^{-1} (Dh); \qquad \text{(B8)}$$

where D corresponds to a hypothesis design matrix (representing linear combinations of effects), h corresponds to the vector of regression coefficients (represented in the linearized Base model in Section 2.2 of this appendix), and V is the estimated covariance matrix associated with h.

The discussion of hypothesis tests will be presented in order of complexity, beginning with the simplest test.

(a) INTERACTION EFFECTS

The tests termed Interaction Effects in Table 4.2 correspond to tests of the significance of CES parameters q and r. In terms of the linearized form presented in B 2.2, these tests correspond to tests of the hypothesis h4 = h5 = 0 (in the general case) and h4 = 0 and h5 = 0 (in the Intergenerational, and Within Career cases, respectively). Given the linearized variables with which the regression coefficients are associated, these tests indicate the significance of differences among individuals who experienced occupational mobility. This interpretation follows from the fact that log(S/E) and log(E/O) will have zero values whenever no mobility is observed.

(b) CONTRASTS

Contrasts within life cycle stage are not based on the CES specification. Rather, they correspond to tests of the difference between the regression coefficient associated with one status and the coefficient which logically precedes it, that is to the hypothesis h2 - h1 = 0 and h3 - h2 = 0. Thus, in combination with the tests on h4 = 0 and h5 = 0, it is possible to examine the significance of change in response across the life cycle. Each chi-square representing general Contrasts in Table 4.2 is formed by taking the difference between a chi-square testing the composite hypothesis (h1 - h2 = 0 and h4 = h5 = 0) and an Interaction chi-square (testing the hypothesis h4 = h5 = 0). This chi-square corresponds to the general hypothesis that there are different responses to status over and above the general response that represented by the CES parameter v.

(c) MARGINAL EFFECT

The marginal effect v may be tested by evaluating the general hypothesis h1 = h2 = h3 = h4 = h5 = 0 and subtracting the general Contrasts and the general Interaction chi-squares. Thus, the general chi-squares sum to a chi-square which evaluates the Base component of each equation, while the chi-square associated with the Marginal Effect tests the association between fertility and status regardless of life cycle stage.

B4. Two Stage Estimation and Reduced Form Estimates

The assumption of reciprocal relations between mobility and fertility requires that allowance be made for correlations among the error components of fertility, current status, mobility and BIND. Replacing observed values of these variables by smoothed estimates taken from regressions involving only truly exogenous variables satisfies this requirement. The exogenous variables are those that represent characteristics acquired prior to or at the time of labour force entry and some reflecting labour market conditions. It is not necessary that the coefficients of these Reduced Form equations be consistently estimated in order to provide consistent estimates of reciprocal effects in the second stage regressions. All that is required is that the observations be purged of the components contributing to the lack of independence between their error terms.

The treatment of the mobility variable (M'_s = log(S/E)) requires special consideration. It is possible to provide for this variable in two ways: (1) by reduced form estimation of S' followed by derivation of M'_s or (2) by direct estimation both of M'_s and $(M'_s)^2$. Approach (1) might provide the most internally consistent estimates, but may fail to provide appropriate accommodation for the special error characteristics involved. Consequently, it was decided to treat M'_s as if it were a variable in its own right.

The following tables provide basic results of the reduced form equations. The results are presented in the form of estimated semi-partial correlations between the selected exogenous variables (defined in Section 3.4) and the variables identified as being endogenous.

It is of interest to note that (in each case but one) the contribution of status E is greater than that of status O. A result of this sort is more in agreement with human capital (or child quality/parental investment) theory than with status inheritance. Background status effects, per se, appear to be generally more important than work history effects. (UE, PUE and MOVE are included as proxies for external labour market conditions; but may, especially in the female case, be confounded with some aspects of the

TABLE B.1 - WORK AND STATUS VARIABLES

	lnCEB	lnS	$(\ln(S/E))^2$	lnBIND
MALE				
LnO	-0.014*	0.038	0.019*	0.140*
LnE	-0.052*	0.242*	-0.302*	0.130*
$(\ln(E/O))^2$	-0.053*	0.084*	0.141*	0.036
UE	-0.033	0.047*	0.087*	0.018
PUE	-0.052*	-0.037	-0.093*	0.027
MOVE	0.047	0.013	0.024	0.062*
FRUR	-0.055*	-0.060*	-0.085	0.104*
FEMALE				
LnO	0.025	0.079*	0.137*	0.001
LnE	-0.051	0.204*	-0.220*	0.168*
$(\ln(E/O))^2$	0.070*	0.099*	0.230*	-0.006
UE	-0.034	0.168*	0.100*	0.142*
PUE	0.043	-0.025	-0.062	-0.092*
MOVE	-0.014	-0.009	0.110*	-0.068
FRUR	0.024	-0.053*	-0.019	-0.035*

* $p < 0.1$

fertility-mobility decision). Negative relations between fertility and status variables are consistent with expectations. Similarly the positive relations between status variables are as expected. The relatively stronger association between S and other status variables and than between BIND and those same status variables suggests substantial individual variability that is not captured in occupational status measures.

Family background variables (Table B.2) appear to have a weak partial association with fertility, but are relatively stronger in their impact on status. The education variables may be highly correlated, reflecting common educational standards and homogomy rather than specific parental aspirations. The weakness of the working mother variable (MWRK) in the FEMALE results seems surprising, but might be considered in the context of selection for labour force participation in the female sample. It is of interest that these background variables are more strongly associated with the individual status measures (BIND) than the occupational measure (S) for males, while the reverse seems to be the case for females. There might be less opportunity for differences in background among females to be translated into differences in achievement (especially of income). For both males and females, the strong ED effect on BIND represents a feature of the construction of the variable (a weighted combination of income and years of education), rather than a directly meaningful effect.

TABLE B.2 - FAMILY BACKGROUND VARIABLES

	lnCEB	lnS	$(\ln(S/E))^2$	lnBIND
MALE				
ED	-0.011	0.195*	0.073*	0.272*
FED	-0.024	0.060*	0.043	0.045*
MED	0.014	0.020	0.043	0.060*
MWRK	-0.028	0.046*	0.0002	0.010
SIBS	0.031	-0.014	-0.053*	0.065*
OSIBS	0.020	0.018	-0.004	0.116*
FEMALE				
ED	-0.079*	0.211*	-0.105*	0.240*
FED	0.024	-0.114	0.096	0.053
MED	0.038	-0.008	-0.062	-0.066
MWRK	-0.097	0.048	-0.018	-0.040
SIBS	0.049	-0.141*	-0.088	-0.052
OSIBS	0.015	0.087*	0.014	-0.076*

* $p < 0.1$

The variables characterized as personal background variables (Table B.3) comprise those representing duration effects, as well as those which are generally supposed to be associated with attitudes common to groups or group norms (e.g. cohort, nativity, religious, or linguistic groups). Duration effects on male fertility appear to involve marriage duration exclusively, with no evident cohort trend. Corresponding effects on status achievement include labour force experience, marriage duration, as well as perhaps a cohort trend. Individual achievement appears to be strongly associated only with experience (perhaps implying an increase in heterogeneity with experience). Female duration effects appear to reverse the male case, with fertility being more complex than status achievement. The female cohort fertility trend is consistent with post-war increases leading to the babyboom and the MARDUR and YLF signs are also as expected.

Female levels of achievement (both S and BIND) are strongly negatively associated with marriage duration, an effect that could reflect deterioration in marketable skills since marriage or first birth. Male and female experience effects have a common and expected positive sign. However, the signs of the age trends differ, an effect that corresponds to known differences in the trends in male and female labour force participation. The group variables are generally very weakly associated with the dependents and there is no obvious interpretation for the single significant religion effect in each of the male and female sets (i.e. no interpretation of a religion effect to the exclusion of all other potential group effects).

TABLE B.3 - PERSONAL BACKGROUND VARIABLES

	lnCEB	lnS	$(\ln(S/E))^2$	lnBIND
MALE				
ln(AGE-17)	-0.003	-0.072*	0.029	-0.028
ln MARDUR	0.229*	0.101*	0.001	-0.031
ln YFL	-0.006	0.095*	0.018	0.041*
RNAT	0.022	0.001	0.017	-0.017
MNAT	-0.026	-0.005	-0.030	0.031
R x M (NAT)	-0.027	-0.008	-0.013	0.003
REL	-0.017	0.067*	-0.034	0.026
LANG	-0.030	0.029	0.000	-0.004
R x L	0.027	-0.034	0.0001	-0.009
FEMALE				
ln (AGE-17)	0.072*	0.058	-0.001	0.044
ln MARDUR	0.225*	-0.104*	0.036	-0.130*
ln YFL	-0.147*	0.065*	0.012	0.056
RNAT	0.047	0.014	-0.022	0.017
MNAT	-0.018	0.030	0.007	-0.001
R x M (NAT)	-0.042	-0.020	0.016	-0.016
REL	-0.056	0.036	0.169*	0.056
LANG	0.056	0.034	-0.049	-0.039
R x L	-0.028	-0.026	0.022	-0.022

* $p < 0.1$

The general fit of each equation was quite good (equations were highly significant as judged by F-ratios). The squared multiple correlations for each equation were as follows:

TABLE B.4 MULTIPLE CORRELATIONS (SQUARED)

	lnCEB	lnS	$(\ln(S/E))^2$	lnBIND
MALE	0.529	0.570	0.206	0.635
FEMALE	0.762	0.696	0.300	0.627

The relatively better fit in the FEMALE equations may only be an outcome of a more homogenous sample (i.e. generally greater homogeneity among female labour force participants than is the case among males). The relatively better fit of the male BIND equation compared to the occupational status equation may be related to the preponderance of individual background variables, and to the neglect of market structure factors like regional differentials, industry or sector.

The systematic effects that remain in the dependent variables may be considered by examining the second order partial correlations between the residuals of each pair of equations with the other two sets of residuals controlled. These correlations are as follows:

TABLE B.5 - RESIDUAL PARTIAL CORRELATIONS

		lnCEB	lnS	$(\ln(S/E))^2$
FEMALE				
	lnCEB			
	lnS	-0.109		
	$(\ln(S/E))^2$	-0.053	0.127	
	lnBIND	-0.251	0.123	0.017
MALE				
	lnCEB			
	lnS	-0.055		
	$(\ln(S/E))^2$	0.096	0.561	
	lnBIND	0.026	0.136	0.012

Critical values for these correlations are approximately 0.12 for females and 0.06 for males, at the 0.10 level. Female fertility appears to be more strongly associated with the other variables, than is the case with male fertility. However, that is likely to confound sample selectivity associated with achievement, part-time work and the time demands of children. The associations among male status variables are stronger than is the case for females, which may reflect access to more stable labour markets or greater rigidity in male, lifecycle labour force participation.

Had these dependent variables been added appropriately to the reduced form equations, the squared multiple correlations would have been increased to approximately the level of systematic variance. The resulting values are:

Table B.6 PROPORTIONS OF SYSTEMATIC VARIATION

	lnCEB	lnS	$(\ln(S/E))^2$	lnBIND
MALE	0.535	0.714	0.465	0.646
FEMALE	0.783	0.713	0.316	0.660

The complements of these values reflect the proportions of variance that could be regarded as being external to the system of equations (perhaps being truly random). The magnitudes are sufficiently high to represent strong structural associations among the observations.